GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

Date: 2/23/80

Project Title: Energy Conservation Assistance to Georgia Appalachian Industries

Project No: A-2535

Project Director: Douglas M. Moore

Sponsor: Georgia Office of Energy Resources

Agreement Period: From 10/1/79 Until 12/30/80

Type Agreement: Contract No. 169 dated 10/1/79 (subcontract under Appalachian Regional Commission Contract No. 79-176 which is a subcontract under DOE Grant No. GA6908-79-1-220C-0612)

Amount: $78,958

Reports Required: Quarterly Progress Report; Draft Final Report; Final Report

Sponsor Contact Person (s):

Technical Matters

Contractual Matters
(thru OCA)

Mr. Ed Bistany
Office of Planning & Budget
Georgia Office of Energy Resources
270 Washington St.
Atlanta, GA 30332
(404) 656-5176

Defense Priority Rating: n/a

Assigned to: TAL/ECD (School/Laboratory)

COPIES TO:

Project Director
Division Chief (EES)
School/Laboratory Director
Dean/Director–EES
Accounting Office
Procurement Office
Security Coordinator (OCA)
Reports Coordinator (OCA)

Library, Technical Reports Section
EES Information Office
EES Reports & Procedures
Project File (OCA)
Project Code (GTRI)
Other

B53 320

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

Date: April 28; 1981

Project Title: Energy Conservation Assistance to Georgia Appalachian Industries

Project No: A-2535

Project Director: Douglas M. Moore

Sponsor: Georgia Office of Energy Resources

Effective Termination Date: 12/30/80

Clearance of Accounting Charges: 12/30/80

Grant/Contract Closeout Actions Remaining:

- X Final Invoice and Closing Documents
- _ Final Fiscal Report
- _ Final Report of Inventions
- _ Govt. Property Inventory & Related Certificate
- _ Classified Material Certificate
- _ Other _____

Assigned to: TAL/ECD (School/Laboratory)

COPIES TO:

Project Director
Division Chief (EES)
School/Laboratory Director
Dean/Director–EES
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Security Coordinator (OCA)
Reports Coordinator (OCA)

Library, Technical Reports Section
EES Information Office
Project File (OCA)
Project Code (GTRI)
Other _____

CA-4 (1/79)

WORK PLAN

FOR A PROGRAM OF ENERGY CONSERVATION ASSISTANCE

TO GEORGIA APPALACHIAN INDUSTRIES

Submitted To:

Georgia Office of Energy Resources

and the Appalachian Regional Commission

ARC Contract No. 79-176

December 18, 1979

Engineering Experiment Station

Georgia Institute of Technology

Atlanta, Georgia 30332

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this Work Plan is to define the scope, methodology, and goals of a program of energy conservation assistance to Georgia Appalachian industries. This program, sponsored by the Appalachian Regional Commission and conducted by the Georgia Tech Engineering Experiment Station and the State of Georgia Office of Energy Resources, will be directed toward smaller industries in the Georgia Appalachian Region, specifically those with 200 or less employees.

This program will be conducted in a manner similar to the Industrial Energy Extension Service, a statewide energy conservation program conducted by Georgia Tech and sponsored by the Office of Energy Resources, and will complement that program which heretofore has concentrated on larger industries. The ARC program will provide in-plant energy surveys to at least thirty industrial plants. Emphasis will be on areas requiring little or no capital expenditures. Two workshops covering relevant areas of energy conservation will be presented toward the end of the year. Literature necessary to aid the small industries in establishing energy management programs will be developed and distributed. These items are discussed in further detail in the following pages.

II. DEVELOPMENT OF LITERATURE

Energy survey forms, energy consumption forms, and technical information for use by industries in implementing energy conservation techniques has been and will continue to be developed for use in the program. Examples of energy survey and consumption forms proposed for use are included in Appendix A. Technical information covering such areas as electrical demand control systems, lighting, heating and air conditioning, boiler and steam systems, compressed air systems, and operating and maintenance procedures will be developed and distributed where applicable. Case studies of energy conservation techniques implemented will be documented and distributed to industries where these techniques would be appropriate.

To annouce and promote the program, a brief flyer outlining the program will be distributed to potential candidates in the Appalachian Region. A mailing of three to four hundred flyers is anticipated. The Conserver, a bi-monthly newsletter produced by the Engineering Experiment Station as part of the IEES program, will also carry this announcement, plus any pertinent news, case studies, etc. which develop during the course of the program.

III. ENERGY SURVEYS

The major effort of the program will be placed on the in-plant energy surveys. The small size of the plants to be surveyed will normally result in a one-day visit, during which the surveyor will discuss with the plant management such topics as current patterns of energy use, monitoring energy costs, and establishing an energy management program. A survey of the facilities will be conducted to identify potential areas for energy conservation. Measurements will be taken to facilitate estimation of the energy and cost savings potential in each area. Instrumentation available for this purpose includes various mechanical and electronic thermometers, volt-amp meters, light level meters, combustion analysis equipment, air velocity measurement equipment and other miscellaneous items. Tests of boiler efficiency will be conducted for all boilers in service.

After completion of the plant visit, a report will be submitted to the plant management outlining specific recommendations for energy conservation identified in their plant. Primary emphasis will be placed on recommendations that require little or no capital expense.

The report will include estimated energy and cost savings, with supporting calculations. Preference will be given to those companies specifically requesting assistance. A minimum of thirty plant surveys will be conducted.

IV. WORKSHOPS

Two energy conservation workshops will be presented in the Georgia Appalachian Region. The purpose of these workshops will be to:

- Stimulate interest in and awareness of energy conservation in the small industries.
- Transfer technical information on energy conservation techniques
- Encourage the transfer of information between the industries

The exact subject matter to be covered will be based on the interests and needs revealed by the plant surveys. Case studies of plants having implemented energy conservation programs will be presented.

Each workshop will last approximately six hours with a lunch break at the middle of the program. A nominal fee will be charged to cover the cost of lunch and materials.

The workshops have been scheduled on a preliminary basis for September 16 and October 21, 1980.

V. PROGRAM EVALUATION

To determine the effectiveness of the in-plant energy surveys, all plants that are surveyed will be contacted a sufficient period of time after the survey to determine the degree of implementation of the energy conservation recommendations and actual energy savings. This information will be tabulated and summarized in the final report. Firms which participate in the workshops will be sampled to provide a data base for projection of total energy savings resulting from information obtained at the workshops. This data will also be included in the final report.

VI. SCHEDULE

The proposed schedule for the project for calendar year 1980 is shown schematically on the following page. Activity for 1979 has been primarily in the areas of planning and promotion of the project. Energy surveys will begin in January as soon as possible after receipt of approval of this Work Plan. Dates indicated for the two workshops are tentative at this time and subject to change.

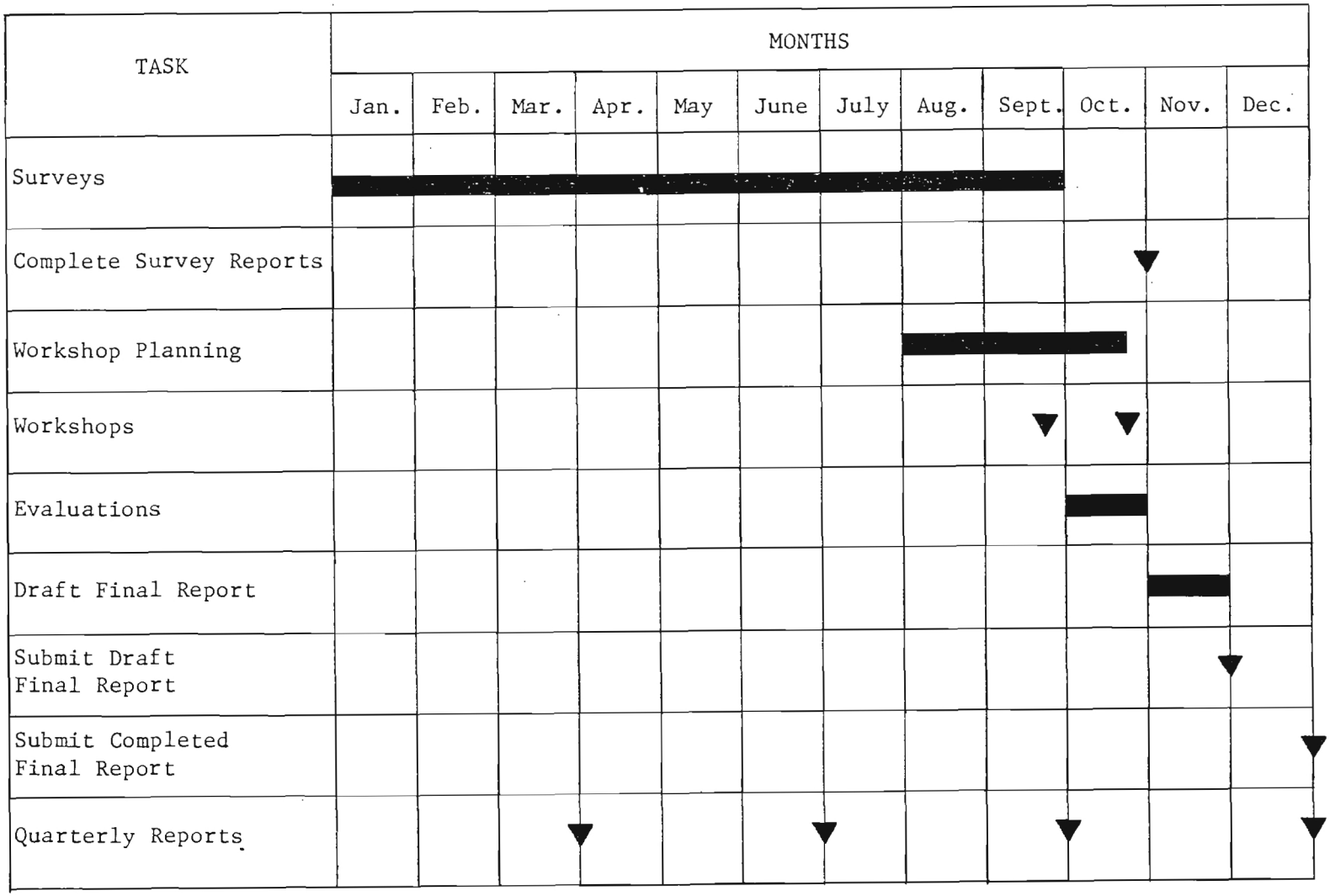


Figure 1. PROPOSED SCHEDULE

APPENDIX A

ENERGY SURVEY FORMS

ELECTRICAL ENERGY CONSUMPTION

SUPPLIER:				RATE SCHEDULE:	
YR.	MO.	CONSUMPTION (KWH)	ACTUAL DEMAND (KW)	BILLING DEMAND (KW)	COST ($)
	JAN.				
	FEB.				
	MAR.				
	APR.				
	MAY				
	JUN.				
	JUL.				
	AUG.				
	SEPT.				
	OCT.				
	NOV.				
	DEC.				
TOTAL			—	—	

YR.	MO.	CONSUMPTION ( )	COST ($)	CONSUMPTION ( )	COST ($)	CONSUMPTION ( )	COST ($)
	JAN.						
	FEB.						
	MAR.						
	APR.						
	MAY						
	JUNE						
	JULY						
	AUG.						
	SEPT.						
	OCT.						
	NOV.						
	DEC.						
TOTAL							

FOR GA. TECH USE
PLANT CODE _____
PLANT VISIT DATE _____

ENERGY CONSERVATION SURVEY

INSTRUCTIONS: This questionnaire is intended to supply background information for use in determining potential areas for energy conservation in your plant. Although answers to every question are not essential, completeness and accuracy will aid greatly in producing meaningful results. Company names and proprietary information shall be considered confidential unless written authorization is received.

GENERAL

COMPANY _____

ADDRESS _____

_____ TELEPHONE NO. _____

PLANT CONTACT _____ GA. TECH. CONTACT _____

NUMBER OF EMPLOYEES _____ ANNUAL SALES VOLUME _____

PRODUCTION SCHEDULE _____ HRS/SHIFT _____ SHIFTS/DAY _____ DAYS/WK _____ WKS/YR.

DIRECTIONS TO PLANT _____

_____

PRINCIPLE PRODUCTS

DESCRIPTION	UNIT	APPROXIMATE ANNUAL PRODUCTION	PERCENT OF SALES

RESULTS OF ENERGY CONSERVATION PROGRAMS:

_____

_____

_____

_____

_____

PAST CONSECUTIVE 12 MONTHS
ELECTRICAL ENERGY CONSUMPTION

SUPPLIER: _____

NOTE: IF MORE THAN ONE METER IS USED, FILL OUT HISTORY FOR EACH METER.

	ACCT. NO. _____ SERVES _____ RATE _____				ACCT. NO. _____ SERVES _____ RATE _____			
YR. MO.	CONSUMPTION KWH	ACT. DEM. KW	BILL. DEM. KW	COST	CONSUMPTION KWH	ACT. DEM. KW	BILL. DEM. KW	COST
JAN								
FEB								
MAR								
APR								
MAY								
JUN								
JUL								
AUG								
SEP								
OCT								
NOV								
DEC								
TOTAL		—	—			—	—	

REMARKS:

PAST CONSECUTIVE 12 MONTHS
MISCELLANEOUS FUEL CONSUMPTION

FUEL TYPE _____

BTU CONTENT PER UNIT _____

SUPPLIER _____

YR. MO.	CONSUMPTION UNITS _____	COST
JAN		
FEB		
MAR		
APR		
MAY		
JUN		
JUL		
AUG		
SEP		
OCT		
NOV		
DEC		
TOTAL		

* WHERE MONTHLY CONSUMPTION IS NOT KNOWN, ENTER PERIODIC DELIVERY QUANTITIES AND COSTS.

A-2535

Quarterly Progress Report

Appalachian Regional Commission
Energy Conservation Program

January 1, 1980 - March 14, 1980

Submitted to:

Georgia Office of Energy Resources
and the Appalachian Regional Commission

ARC Contract No. 79-176
Ga. OER Contract No. 169
Ga. Tech Project No. A-2535

March 17, 1980

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

1st QUARTER ACTIVITY

Reporting Period: January 1, 1980 - March 14, 1980

1. Initial Planning and Promotion:

- See attached example of brochure marked Exhibit 1. Copies of this brochure were sent to approximately 400 prospective manufacturers in the Appalachian region.

- An announcement of the program was carried by two publications of the Engineering Experiment Station, the EES Report and the Conserver. Copies of these publications, marked Exhibit 2 and Exhibit 3, are attached. In addition, a similar news release was distributed to several local newspapers. These announcements and brochures have resulted in nine plant contacts to date.

2. Plant Energy Surveys:

- The following table summarizes activities for the quarter:

Plant Code	Date(s) of Plant Visits	Date of Report	Recommended Energy Savings - BTU x 10^6
D 2201	1/10	2/27	929.2
D 2202	2/11, 2/28 3/13		
D 3501	2/11	2/22	44.7
D 2501	2/13		
D 2401	2/19	3/10	25349.0
D 2203	2/26, 3/3		
D 2402	3/4		
D 3502	3/7, 3/11		

- The attached list of audited plants contains general information on each plant.

3. Other Activities:

- An in-depth study is being conducted with Plant No. D 2202, a carpet dyer located in Dalton. Because this industry has

traditionally been highly energy intensive, the plant management is initiating a comprehensive energy conservation program. The company is currently installing indirect steam heat exchangers in their dye decks, which is expected to reduce the steam consumption of this equipment by 20 to 40 percent. A case study of this manufacturer will be developed, for distribution to other carpet dyers in the region.

4. Plans for Second Quarter:

- Approximately ten plant surveys will be conducted.
- Development of case studies will be continued.

ARC ENERGY CONSERVATION PROGRAM

Summary of Surveyed Plants

Company D 2201
Location: Dalton (Whitfield)
Employment: 50
Carpet Tufting 2272

Company D 2202
Location: Dalton (Whitfield)
Employment: 50
Carpet Finishing 2272

Company D 3501
Location: Dalton (Whitfield)
Employment: 63
Textile Machinery & Equip. 3552

Company D 2501
Location: Clayton (Rabun)
Employment: 50
Metal Display Racks 2542
Aircraft Components 3728
Nuclear Components 3322

Company D 2401
Location: Trenton (Dade)
Employment: 45
Softwood Rough Lumber 2421
Softwood Dressed Lumber 2421

Company D 2203
Location: Rome (Floyd)
Employment: 80
Raw Stock Dyeing & Blending 2261

Company D 2402
Location: Clarkesville (Habersham)
Employment: 5
Custom Cabinet Work 2434
Millwork 2431
Wood Pallets 2448

Company D 3502
Location: Norcross (Gwinnett)
Employment: 100
Egg Merc. & Handling Systems 3551
Air Curtain Refrig. 3585
Wire Racks & Guards 3469
Custom Metal Fabrication 3441

Industrial energy
CONSERVER
Published by the Industrial Energy Extension Service
Vol. 3, No. 1 January, 1980

Poultry processing plant saving energy

Gold Kist's poultry processing plant in Ellijay has improved its energy efficiency by approximately 20 percent through installation of new energy-conserving equipment and industrial processes.

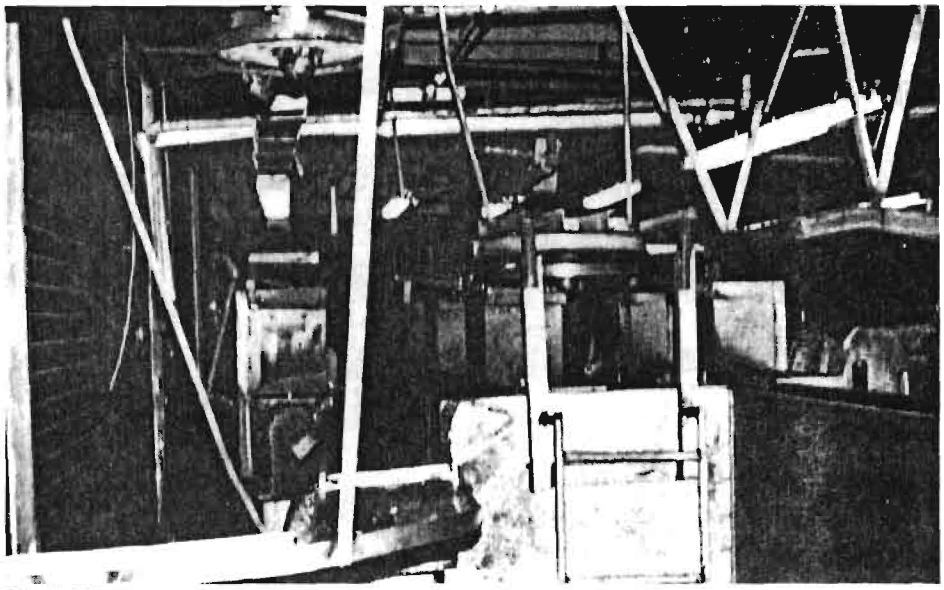
From January to July, 1979, Gold Kist's Ellijay plant saved nearly $29,000 in fuel costs after renovation of several of its major energy-consuming operations. The plant reduced energy usage by the equivalent of 1,357 gallons of fuel oil while increasing production by 27 percent.

Gold Kist realized these savings through a conservation project sponsored by the Department of Energy and conducted by Georgia Tech's Engineering Experiment Station.

The project was undertaken because the poultry industry is energy intensive. Georgia Tech selected the Ellijay Gold Kist plant for its research project because of the plant's representative size, operations and production volume. Federal officials hope that the technology developed through the Gold Kist project will be adopted by other poultry processors wishing to achieve similar fuel savings.

Acting on the recommendation of Georgia Tech researchers, Gold Kist implemented the following proposals:

• Installation of a new poultry scalder. Tech engineers found that the Ellijay plant could save energy by reducing the water capacity of the scalder, covering the scalder surface to reduce evaporation heat losses, insulating the sides to hold in heat and regulating the scalder temperatures more closely. All but the first of these recommendations are possible without purchase of a new scalder.



THIS NEW poultry scalder was installed recently at the Gold Kist processing plant in Ellijay with features which will conserve energy. The work was done as part of a project sponsored by the Department of Energy and conducted by Georgia Tech Engineering Experiment Station.

• Installation of waste heat recovery systems. One of the plant's biggest energy users is its refrigeration system and, before the DOE project was done, considerable amounts of heat were discharged in the cooling process. Tech engineers suggested that a heat exchanger be installed to transfer this energy for use in heating water for scalder and cleanup operations. Gold Kist also put in equipment to recover the heat from its scald water overflow. The energy is recycled to heat makeup water added to the scald tank.

• Changes in the plant's equipment cleanup procedure. Poultry processors are required by USDA to thoroughly clean their plants each day. To save energy, Tech engineers suggested that Gold Kist increase the water pressure used in cleaning hoses while reducing the water flow.

Of these recommendations, the most important concerns the scalder. The new scalder purchased by Gold Kist uses 65 percent less steam than its predecessor. Further savings are expected with continued use of the new heat exchangers and cleanup system.

The project required the purchase of $126,000 in new equipment. Of this sum, Gold Kist paid $50,000 and contributed manpower for the project. Projected annual

(Continued on page 2)

Appalachian industries getting help

Industries in the Appalachian counties of Georgia with work forces of less than 200 persons can participate in a new energy conservation program in 1980.

The Appalachian Regional Commission (ARC), in cooperation with the Georgia Office of Energy Resources, has hired Georgia Tech's Engineering Experiment Station to provide cost-free technical assistance and in-plant energy surveys to any of approximately 1,000 small to medium-sized industries in the 35 Appalachian area counties.

Staff engineers from Tech's Experiment Station will perform the energy surveys. They also will conduct two industrial energy conservation workshops on as-of-yet undesignated topics near the end of 1980.

Participation in the program is voluntary. Further information is available from project director Doug Moore at Georgia

(Continued on page 3)

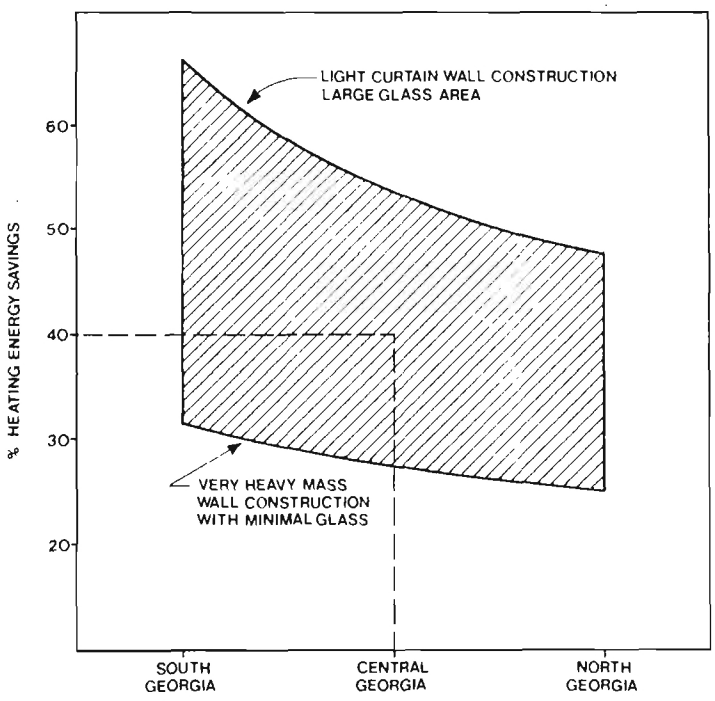
Energy Saver #7

Night setback of space temperature

Decreasing the temperature difference between inside and outside saves energy by reducing heat loss through outside walls, reducing fan equipment run time and decreasing ventilation air leaking into the air handling system. Actual savings will depend on the location, type building, type heating system, and original thermostat setting.

The following graph gives a rough approximation of expected energy savings for night setback based on building location and type of construction.

APPROXIMATE NIGHT SETBACK SAVINGS BASED ON 10° SETBACK FOR 12 HR/DAY AND 42 HR/WEEKEND



XAMPLE

A Central Georgia company has a building with medium wall construction and inimal glass areas. The building's heating system is left on at night during the winter onths with the thermostat set at 72° F. The heating energy costs run about $8,000 per ear. What cost savings are available by installing a night setback control system for the uilding?

Based on the graph, this type of operation could expect a heating energy reduction of up 40 percent with a night setback of 10° F. This would result in an approximate savings of ,200 per year. The cost of the night setback system will probably pay for itself in one ating season.

Appalachian energy program begins

(Continued from page 1)

Tech, Engineering Experiment Station, Atlanta, Ga. 30332 (Telephone: 894-3412).

The ARC program will be modeled after the Industrial Energy Extension Service (IEES), a larger project whose purpose is to help industries throughout Georgia to improve energy efficiency in their plants.

The ARC program has been funded because many small to medium sized industrial plants lack the technical expertise to identify areas with energy conservation potential and to design comprehensive conservation programs.

Conservation areas to be stressed by ARC engineers will be electrical demand control systems, lighting, heating and air conditioning, boiler operations, air compressors and operating and maintenance procedures.

Appalachian Georgia has a total of roughly 1,200 industries. Of this number, 85 percent have less than 200 employees and 62 percent employ under 50 persons. Almost half of these industries are involved in textiles, apparel or food manufacturing operations.

IEES now offers 31 energy flyers

IEES now has 31 one-page energy flyers that are available free to all industries in Georgia.

Please order by number from the Industrial Energy Extension Service, Engineering Experiment Station, Georgia Tech, Atlanta, Georgia 30332. Additional flyers are now being prepared and will be available in the near future.

Gasohol fact sheet prepared

Georgia Tech researchers have developed a fact sheet assessing the potential for production of gasohol in Georgia by farmers and small businessmen.

The report, written by W. W. Carr and D. J. Coughlin of Tech's Engineering Experiment Station, is a complete summary of the problems and benefits facing the would-be small producer of alcohol-mixed fuels.

The fact sheet is available at no charge. To receive it or to obtain further information, write: Ms. Robin Farrow or Dennis Coughlin, Georgia Institute of Technology, Technology Applications Laboratory, Engineering Experiment Station, Atlanta, Georgia 30332 (Telephone: (404) 894-3412).

Apartment managers to receive energy training

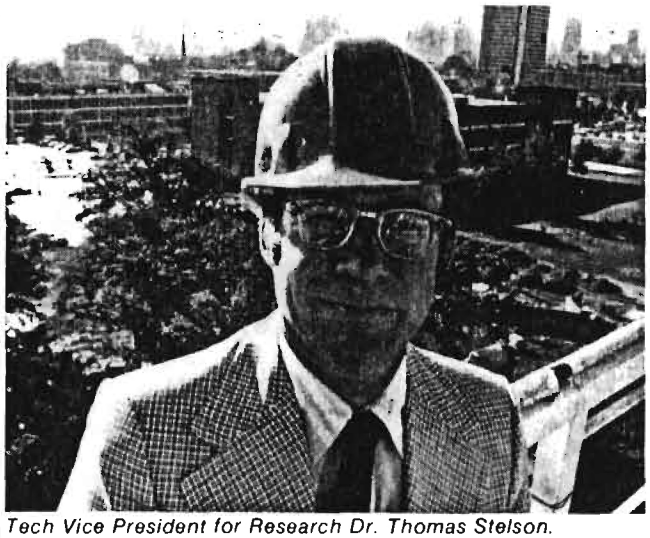
A group of Georgia apartment owners and managers can learn ways to make their complexes more energy efficient through a new conservation program operated by Georgia Tech's Engineering Experiment Station.

The program is sponsored by the Georgia Office of Energy Resources and will be conducted for the Apartment Owners and Managers Association, a professional organization with members throughout the state.

The project calls for Experiment Station engineers to develop an energy conservation manual specially designed for apartment construction. Participants also will receive training in marketing apartments with energy conservation features.

The program will include two workshops in mid-March and additional seminars may take place after the current project ends.

Proposals to be offered by Tech engineers will take into account the necessity of cost-effective energy conservation.



Tech Vice President for Research Dr. Thomas Stelson.

Tech Vice President For Research Waiting For Senate Approval

Dr. Thomas Stelson, Tech vice president for research, is waiting for Senate approval to accept a DOE position as assistant secretary for conservation and solar energy.

The position, created by newly-appointed Energy Secretary Dr. Charles Duncan, would cover almost all of the federal government programs involving conservation, new types of automobiles and solar energy. The government defines solar energy as covering wind, wood and hydroelectric power, as well as gasohol and alcohol made from agricultural products.

The 51-year-old Stelson, a civil engineer, is a member of the Energy Research Advisory Board of DOE, the Board of the Southern Solar Energy Center, and is Science and Technology Advisor to Gov. George Busbee of Georgia.

If approved for this position with DOE, Stelson would take a year's leave of absence from his duties at Tech. He is now head of all Tech's research programs, which include those of the Engineering Experiment Station.

Stelson is currently spending two days a week in Washington, D.C., on a consulting basis to DOE.

In Georgia

Small Appalachian Industries Get Free Energy Assistance

Industries in the Appalachian counties of Georgia with work forces of less than 200 persons can participate in a new energy conservation program in 1980.

The Appalachian Regional Commission (ARC), in cooperation with the Georgia Office of Energy Resources, has hired the Engineering Experiment Station to provide cost-free technical assistance and in-plant energy surveys to any of the approximately 1,000 small- to medium-sized industries in the 35 Appalachian area counties.

Staff engineers from EES will perform the energy surveys. They also will conduct two industrial energy conservation workshops on as-of-yet undesignated topics near the end of 1980. Participation is voluntary.

The ARC program will be modeled after the EES Industrial Energy Extension Service (IEES), a larger project whose purpose it is to help industries throughout Georgia to improve energy efficiency in their plants.

The ARC program has been funded because many small- to medium-sized industrial plants lack the technical expertise to identify areas with energy conservation potential and to design comprehensive conservation programs.

Conservation areas to be stressed by ARC engineers will be electrical demand control systems, lighting, heating and air conditioning, boiler operations, air compressors and operating and maintenance procedures.

Industry in Georgia is responsible for 27 percent of the state's energy use. By trying such simple measures as turning out unnecessary lights and adjusting boilers, some Georgia industries have realized energy savings of 10 to 20 percent. With comprehensive energy management programs, the energy efficiency of some industrial operations has improved by as much as 40 percent.

EES Report
ENGINEERING
EXPERIMENT
STATION
Georgia Institute of Technology
Atlanta, Georgia 30332
(404) 894-3411
Dr. D. J. Grace, Director

Nonprofit
Organization
U.S. POSTAGE
PAID
Atlanta, Ga. 30332
Permit No. 587

A-2535

QUARTERLY PROGRESS REPORT

APPALACHIAN REGIONAL COMMISSION
ENERGY CONSERVATION PROGRAM

April 1, 1980 - June 30, 1980

SUBMITTED TO:

GEORGIA OFFICE OF ENERGY RESOURCES
AND THE APPALACHIAN REGIONAL COMMISSION

ARC Contract No. 79-176
Ga. OER Contract No. 169
Ga. Tech Project No. A-2535

June 30, 1980

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

2ND QUARTER ACTIVITY

Reporting Period: April 1, 1980 - June 30, 1980

1. Preliminary Workshop Planning:

   - Tentative dates and locations for the two energy conservation workshops have been established as follows:

     .. September 16, 1980 - Gainesville, Georgia
     .. October 21, 1980 - Calhoun, Georgia

   - Each workshop will last approximately six hours, with a lunch break at the middle of the program. A nominal fee of approximately $15 per person will be charged to cover the cost of lunch and materials.

2. Plant Energy Surveys:

   - The following table summarizes activities for the previous and current quarters:

Plant Code	Date(s) of Plant Visits	Date of Report	Recommended Energy Savings BTU x 10^6	$
D2201	1/10	2/22	929.2	3,971
Follow-up:	4/18	6/6	6,235	18,705
D2202	2/11, 2/28 3/13, 4/7	3/31	150,300	379,704
D2501	2/13	3/24	186	3,887
D2401	2/19	3/10	25,349	61,207
D2203	2/26, 3/3	4/4	7,573	21,129
D2402	3/4	4/4	65.5	910
D3502	3/7, 3/11, 3/18	3/20	1,536	7,725
D3901	3/19	4/1	463.4	1,382
D3001	4/8	4/21	1,096	8,314
D2001	4/11	4/28	230	1,679
D2204	4/23, 5/14			
D2205	4/29, 5/12	5/30	2,366	9,329
D2206	5/19	6/12	21,671	53,367
D2207	5/27	6/13	249	1,608
D3401	6/11			
D2208	6/9			
D2002	6/9			
D2209	6/24			

- As noted above, a follow-up visit was conducted for Company D2201. This company requested assistance with the installation of a new carpet curing oven. A report was prepared showing that by optimizing exhaust conditions and installing a heat recovery device, the company could save over $18,000 per year. The plant manager has reported that the installing contractor has been directed to install the unit according to the recommendations in our report.

- The attached list of audited plants contains general information on each plant. A detailed listing of energy conservation recommendations is included in the Appendix.

3. Other Activities:

- Plant D2202, Crest Finishers in Dalton, Georgia, was featured in the May issue of the Conserver, the newsletter produced by Georgia Tech through the Industrial Energy Extension Program. A copy of the article, noted Exhibit 1, is included in this report. This plant was chosen to be used as a case study because of its management's commitment to energy conservation and the wide range of conservation measures planned.

- Danny Reed, a project engineer active in the ARC program, addressed the Calhoun, Georgia Rotary Club at their luncheon meeting on June 20th. Mr. Reed spoke on industrial energy conservation and the services available from Georgia Tech under the ARC program.

- Work was initiated on a computer program to facilitate statistical analysis of the results from the plant surveys. The program will provide a convenient means of monitoring the progress of the program and aid in the preparation of reports.

4. Plans for Third Quarter:

- Approximately twelve plant surveys will be conducted.

- Workshop planning will begin in earnest, culminating with the first workshop being conducted at the end of the quarter.

ARC ENERGY CONSERVATION PROGRAM

Summary of Surveyed Plants

Company D 2201
Location: Dalton (Whitfield)
Employment: 50
Carpet Tufting 2272

Company D 2202
Location: Dalton (Whitfield)
Employment: 50
Carpet Finishing 2272

Company D 3501
Location: Dalton (Whitfield)
Employment: 63
Textile Machinery & Equip. 3552

Company D 2501
Location: Clayton (Rabun)
Employment: 50
Metal Display Racks 2542
Aircraft Components 3728
Nuclear Components 3322

Company D 2401
Location: Trenton (Dade)
Employment: 45
Softwood Rough Lumber 2421
Softwood Dressed Lumber 2421

Company D 2203
Location: Rome (Floyd)
Employment: 80
Raw Stock Dyeing & Blending 2261

Company D 2402
Location: Clarkesville (Habersham)
Employment: 5
Custom Cabinet Work 2434
Millwork 2431
Wood Pallets 2448

Company D 3502
Location: Norcross (Gwinnett)
Employment: 100
Egg Merc. & Handling Systems 3551
Air Curtain Refrig. 3585
Wire Racks & Guards 3469
Custom Metal Fabrication 3441

Company D 3901
Location: Rome (Floyd)
Employment: 70
Industrial Laundry 3900

Company D 3001
Location: Oakwood (Hall)
Employment: 49
Telephone Enclosures: 3079
Plastic Sheet Extrusions 3079

Company D 2001
Location: Gainesville (Hall)
Employment: 66
Poultry Feeds: 2048
Dairy Feeds 2048
Hog Chows 2048

Company D 2204
Location: Douglasville (Douglas)
Employment: 130
Synthetic Carpet Yarn 2281

Company D 2205
Location: Dalton (Whitfield)
Employment: 155
Room Size Rugs 2272
Scatter Rugs 2279

Company D 2206
Location: Chatsworth (Murray)
Employment: 75
Bedspread 2392
Draperies 2391

Company D 2207
Location: Calhoun (Gordon)
Employment: 60
Bedspreads 2392
Draperies 2391

Company D 3401
Location: Gainesville (Hall)
Employment: 170
Aluminum Hardware & Trim 3429
Shelf Studs & Brackets 3429

Summary of Surveyed Plants (cont'd)

Company D 2208
Location: Cartersville (Bartow)
Employment: 155
Carpet 2272

Company D 2002
Location: Gainesville (Hall)
Employment: 100
Institutional Foods 2013
Block & Crushed Ice 2097

Company D 2209
Location: Sugar Valley (Gordon)
Employment: 85
Nylon Yarn 2281

EXHIBIT 1

Industrial energy
CONSERVER
Published by the Industrial Energy Extension Service
Vol. 3, No. 3 May, 1980

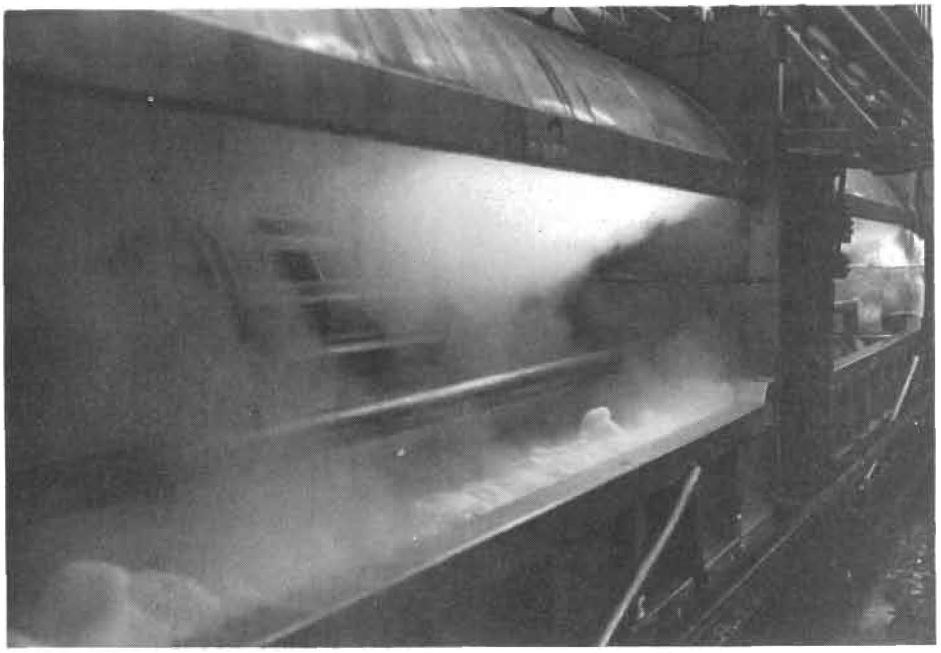
Georgia company saves $300,000 in energy costs

Crest Finishers, Inc., a carpet dying and ıishing company in Dalton, Georgia, ıs initiated a comprehensive energy con- rvation program which could ultimately .ve the company over $300,000 each year energy costs. Virtually every industry in .e area has suffered from recent price creases for gas, oil, and electricity. Crest ıs committed to hold the line on these ɔsts through conservation measures, .ther than passing them along to their ıstomers.

The company recently completed in- allations of indirect steam heating coils their twelve dye becks, which pre- ously were heated by sparging steam rectly into the dye bath. With the indi- ct heat exchanger, steam condensate is ɔw returned to the boiler through a new ɔndensate return piping system, reduc- g the flow of make-up water to the ɔiler feedwater heater to a fraction of the ɾiginal volume. The savings from return the condensate alone is expected to be to 12 percent of the total energy use of ıe boiler, although improvements in ɛating efficiency could increase the total .vings to as much as 30 percent. The ınual cost savings could amount to over 120,000. As an added benefit, the com- any's use of chemicals for water treat- .ent has similarly resulted in additional .vings because of the lower make up vol- me.

Georgia Tech's EES has assisted Crest investigating this and other conserva- on measures, under a program spon- ɔred by the Appalachian Regional Com- ıission and the Georgia Office of Energy esources. The ARC program is designed ɔ serve the smaller industries (200 em- loyees or less) in the Appalachian region f Georgia.

Other conservation measures which are nder consideration include a waste water eat recovery system, optimization of the ye beck temperature control system, ıstallation of doors on the dye becks, ıodifications to the carpet dryer (includ- ıg exhaust heat recovery), and installa- on of loading dock door seals. The com- any's management has used the survey



Dye becks equipped with indirect heat exchanger save 30% in energy costs.

report prepared by Georgia Tech to pur- sue low cost funding for these projects from the Small Business Administration.

The waste water heat reclamation sys- tem under consideration is particularly attractive in terms of the energy and cost savings potential. This system will use the heat energy in the waste water which is discharged to the sewer to preheat the incoming city water used to fill the becks, through the use of a specially designed shell and tube heat exchanger. The sys- tem is designed to heat over 400,000 gal- lons of water each day, from an average inlet temperature of 50° F to a tempera- ture of 120 to 140° F, with energy that previously was literally being dumped down the drain! As an added benefit, since workers will not have to wait for the water in the becks to warm up from the cold initial temperatures, cycle time will be reduced, resulting in increased produc- tion. The installation will reduce energy costs by $180,000 annually, and should pay for itself in less than four months.

Also of interest is the tenter frame dry- er, in which the carpet is dried after dying. Air to air heat exchangers will use the energy in the hot, moisture laden exhaust air from the dryer to preheat intake air, recovering at least 70 percent of the energy in the exhaust air stream. This installation will save almost $20,000 each year in natural gas.

Another technique which has proven to produce significant results in the optimi- zation of the beck temperature control systems. By preventing excessive heat application during the dying process, use- less boiling of the dye bath can be mini- mized. Although this can be accomplished by instructing personnel in the proper adjustment of the controls, an automatic high limit controller has been recom- mended to eliminate the possibility of human error. The energy savings expected to result from this simple measure should be in excess of $30,000 each year.

Assistance under the ARC energy con- servation program is available to all types of industries in the Georgia Appalachian region. For more information, or to schedule a plant survey, contact project director Doug Moore in Atlanta at (404) 894-3412.

IEES engineer Danny Reed measures exhaust temperature from the compressor at United Poultry Corp.

IEES helps poultry facility save energy

A small Georgia poultry grading facility located near Atlanta is saving energy as the result of a continuing energy management program.

Rising electrical costs have been a concern for the management of United Poultry Corporation in Winder, Ga. In 1978, the company installed a system to recover waste heat from the plant's freezers (see the "Conserver," November 1978). Since that time, the company has expanded its freezer capacity. Company management liked the concept of waste heat recovery and included it in the expansion.

The results of the waste heat recovery system will not be known until later in the year. Company officials and engineers from the Industrial Energy Extension Service (IEES) will monitor the processes to determine the energy and cost savings.

According to Danny Reed, IEES food industry coordinator, it is not uncommon to see larger companies taking an interest in energy conservation, but the smaller firms have been slow to do anything. "The work at United Poultry is particularly interesting because it shows that a company does not have to be a giant to save energy," he said.

United Poultry brings in fresh poultry in bulk, cuts and grades it, freezes it and then markets it in the Caribbean Sea Islands.

"Getting the chicken frozen fast is important in our operation," said plant manager Bruce Bate.

For this reason Bate added to the plant's freezer capacity. The old freezers would cool to 35° degrees below zero; the new freezers cool to 40°-50 degrees below zero.

"This cuts down on the amount of time required to freeze the product."

Heat exchangers were installed to recover heat which would normally be rejected from the refrigeration system in the cooling tower. The recovered heat is used to make hot water which can be used for space heating and to wash down the plant at the end of each day.

Tech to hold wood energy workshop

The potential for wood energy in industrial processes is the topic of a May 29 workshop at Georgia Tech in Atlanta.

The session will run from 8:30 a.m. to 12:30 p.m. in Room 3 of Tech's Space Science and Technology Building. Registration is at 8 a.m. and a course fee of $10 will be charged.

Applicants are urged to register well in advance to ensure a place at the workshop. Parking on the Tech campus is limited so course participants should arrive early on May 29 for the session.

The object of the workshop is to provide technical and economic information on equipment and processes in which wood is used as a fuel.

Course material is geared for plant managers and engineering personnel responsible for conversions to alternate fuels. The information presented also will be of benefit to potential wood fuel suppliers, private consultants and officials from government agencies.

On the workshop agenda will be discussions of processes and equipment for gasification, pyrolysis and direct combustion. Case studies will be presented in each of these areas.

Further information on the workshop is available from Joanne Bocek, Georgia Tech, Engineering Experiment Station, Atlanta, Ga. 30332 (Telephone: 404/894-3635).

IEES engineers speak on WTB

IEES was represented by two Georg Tech engineers who participated in th eight-hour marathon Energy Form Exp on WTBS-TV April 26-27. The prograi included film clips, well-known energ authorities, panel discussions, and call-i questions from the television audienc Subjects addressed included the historic energy perspective, energy conservatio the influence of energy on lifestyles, sol energy, nuclear energy and public opi ion following Three Mile Island, an future energy sources. The show wa broadcast nationwide by cable TV st tions carrying WTBS and questions we phoned in toll-free by viewers from acro the country.

Hank Jackson, P.E., of the Energ Conservation Division represented IEE during the first two-hour segment ar spoke on the fossile fuel depletion cris and conservation alternatives to reduce i impact. During this segment film cli were shown of typical residential energ audit procedures. Several oil and g industry representatives were preser who tended to blame the shortages governmental regulation. Mr. Jacks noted that there was only a finite quanti of these fuels in the earth when drilli began and that the most readily accessib supplies were pumped out first. Futu production will cost more because the that is left is deeper or more difficult reach, and eventually all supplies that ca be economically obtained will be exhaus ed. He noted that oil production peak in the U.S. in the early 1970's, and wor production may peak in the 1990's.

David Keith, P.E., also of the Ener Conservation Division, was in the aud ence for the final three-hour segment ar responded to the film which was a seri of interviews with the residents near Thr Mile Island and spoke on nuclear fusio Mr. Keith addressed the psychology nuclear power, noting that America have a natural fear of nuclear energ because atomic bombs were the publi first introduction to nuclear energy. M Keith remarked on the emotional co ponent of the issue and how negative pu lic opinion will likely, together with unfa orable economics, severely limit futu expansion of nuclear power plants. noted that at the present time, with re shortages of fossile fuels, our country ca not afford a wholesale shutdown nuclear plants.

CONSERVER
Ken Wieder, *Editor*

Published bi-monthly by the Industrial Energy Extension Servic

Energy Tip #32

Dock seals reduce heating and cooling expenses

Heating a building is analgous to filling a leaking bucket with water. To keep the bucket full, water must be continuously added. It is better to keep heated air inside a building by sealing the leaks than to spend additional energy for heating replacement air. This analogy is applicable also to air conditioning losses.

Shipping doors are one source of air leaks in factories and warehouses when they are open to the outside during loading and unloading operations. These losses can be reduced with dock seals that provide a snug fit between the loading door and the back of a semi-trailer or truck.

The graph from Energy Tip No. 5 (reproduced for convenience on the back) can be used to determine the annual heat loss for various size openings given an average number of open hours per day during a six month heating season. The size of the open area can be determined from the chart below.

EXAMPLE

A bakery located in Atlanta has eight 8′ x 10′ loading doors. At any given time trucks are being loaded through three of these doors. The truck size is 8′ x 10½′. The average distance from the truck to the loading dock is 8 inches. The warehouse is heated at 65° F with natural gas at a cost of $3.50/million BTU.

From the chart below, the open area at each loading dock is 39.6 square feet. At 24 hours per day the graph gives the annual heat loss as 700 x 10^6 BTU/yr. For three loading docks (average) the annual heat loss is 2,100 x 10^6 BTU/yr. Dock seals installed on each of the eight loading doors at a cost of $900 ea. ($7,200 total) virtually eliminates this loss.

The cost savings are calculated as follows:

$3.50/$10^6$ BTU x 2,100 x 10^6 BTU/yr. = $7,350 annual savings

$\frac{\$7,200 \text{ (installation cost)}}{\$7,350 \text{ (annual savings)}}$ = 1 year simple payback period

Suggested Action

Estimate the amount of energy lost through loading dock doors, taking into consideration the number of doors, door size, truck size and the average number of hours each door is open. Dock seals come in a variety of designs with, of course, a variety of prices. Consult with several vendors to determine the best seal for your applications.

TRUCK SIZE	OPENING	OPEN AREA IN SQUARE FEET (Distance from Truck to Door) 4″	6″	8″	10″
8′x10′6″	8′x8′	17.0	19.9	22.8	25.7
8′x12′6″	8′x8′	8.3	12.5	16.7	20.8
8′x10′6″	8′x9′	25.3	28.2	31.1	34.0
8′x12′6″	8′x9′	10.6	14.4	18.3	22.3
8′x10′6″	8′x10′	33.7	36.6	39.6	42.5
8′x12′6″	8′x10′	18.3	21.9	25.5	29.1
8′x10′6″	10′x10′	49.0	50.2	51.8	53.9
8′x12′6″	10′x10′	33.2	34.7	37.0	39.5

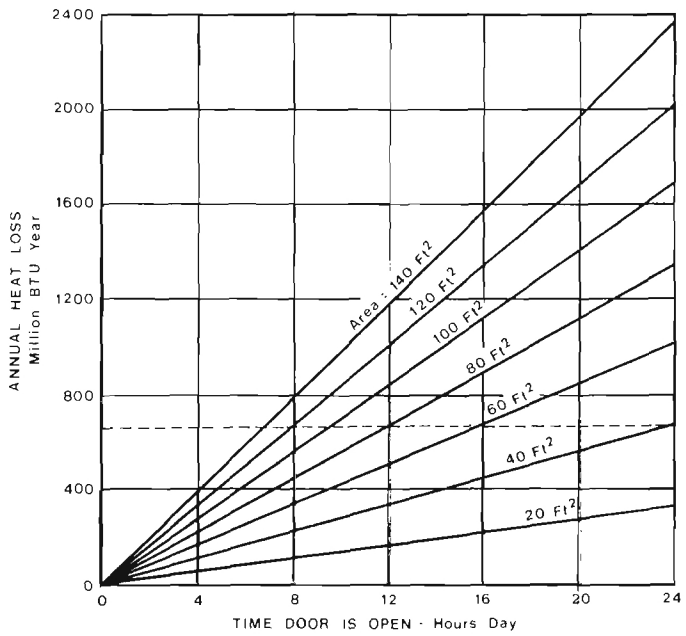


Figure 1 - Heat Loss Through Open Doors

IEES now offers 32 energy flyers

IEES now has 32 one-page energy flyers that are available free to all industries in Georgia.

Please order by number from the Industrial Energy Extension Service, Engineering Experiment Station, Georgia Tech, Atlanta, Georgia 30332.

1. Steam Cost Chart
2. Eliminate Steam Leaks
3. Inspect and Repair Steam Traps
4. Insulate Bare Steam Lines
5. Install Traffic Doors on Frequently Used Openings
6. Boiler Tune-Up
7. Night Setback of Space Temperature
8. Keep Boiler Tubes Clean (Water Side)
9. Reduce Vapor Losses from Heated Open Vessels
10. Return Steam Condensate to Boiler
11. Lower Pressure of Compressed Air to Minimum Necessary Level
12. Install Compressor Air Intakes in the Coolest Locations
13. Eliminate Leaks in Compressed Air Lines
14. Hot Wash Water
15. Recover Heat from Textile Dryer Exhaust Streams
16. Additional Effects Reduce Evaporator Steam Cost
17. Use Refuse as Fuel
18. Convert to More Efficient Light Sources
19. Convert to Energy Efficient Fluorescent Lamps
20. Flashing High Pressure Condensate to Regenerate Low Pressure Steam
21. Minimize Boiler Blowdown
22. Reduce Reflux Ratios in Distillation Columns
23. Heat Recovery from Boiler Blowdown
24. Use Liquefied Gases as Refrigerants
25. Reduce Energy Losses Across Control Valves
26. Skylights Provide Free Illumination
27. Vapor Recompression Can Reduce Steam Costs
28. Heat Recovery from Boiler Flue Gases
29. Use Low Grade Waste Heat to Power Absorption Refrigeration Units
30. Move Electric Motors from Conditioned Spaces
31. Air Curtains Restrict Conditioned Air Loss
32. Dock seals reduce heating and cooling expenses.

Tech researchers design solar classroom

Georgia Tech engineers will design a solar energy system for heating a modular classroom under development.

Tech's Engineering Experiment Station will complete the system for Madison Industries of Georgia, a Conyers-based firm specializing in construction of prefabricated modular buildings.

Madison Industries has a contract from the Department of Energy to prepare the finished engineering design for a modular building with passive solar energy features. The company has subcontracted the solar phase of the work to Tech.

The classroom will be a fabricated unit which can be disassembled and re-erected at different school sites, as population shifts occur in school districts. The passive solar system will be a standard part of the design.

Passive solar devices capture energy from the sun through non-mechanical means, such as natural air flows, shading and moveable insulation. Active solar systems use machines such as motors, pumps and blowers to collect the sun's energy.

"Our design will emphasize passive systems," said Jim Clark, Tech's program manager. "But we can incorporate some elements of an active system, so long as it remains only a small part of the overall design."

Solar energy will provide heat and may be used also to ventilate, light and cool the classroom, Clark said.

"We think solar energy can substantially reduce the structure's fuel costs," he added. "Anything we develop will be applicable to other modular buildings."

Tech will use engineers from its Technology Applications and Energy Research laboratories for the project, with additional help coming from an advisory c mittee of other solar researchers on Tech campus.

The engineering team will submit t proposals to Madison Industries review. One will be used as the basis the final design. If DOE approves completed plans, the agency probably offer Madison the opportunity to b and test market the structure.

Madison Industries deals primaril commercial modular buildings such service stations, mini-warehouses and food restaurants.

"We're pleased to be contractor for project," said Joe Van Dover, marke director for Madison Industries of G gia. "Solar Energy will become incr ingly accepted commercially in co years and we're happy to play a rol furthering market awareness of the a able energy options."

Wieder is new *Conserver* editor

A media specialist has been named editor of *The Conserver*.

Ken Wieder replaces Mark Hodges as editor of the publication. Hodges has become a writer for Georgia Tech's Engineering Experiment Station's public relations staff.

Wieder, 31, will serve as a public information specialist and media technologist for the IEES as well as editor of *The Conserver*.

He comes to the program from the U.S. Center for Disease Control, Atlanta, Ga., where he was a bio-medical photographer.

He has also been editor of "Today's Chiro practic" magazine and a media specialis at Georgia State University in Atlanta.

Wieder is a native of Clifton, N.J., an is a 1971 graduate of the University o Maine. He received his Master's degre also from Maine in 1975. He has als attended Georgia State University.

He is married and lives in Norcross.

Ken Wieder, *Editor*

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APPENDIX

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

lant Code: D-2201 Location: Dalton Principal Product Types Carpet

mployment: 50 Date(s) of Audits: 1/10/80

pproximate Annual Unit Production: _____

pproximate Annual Sales: _____

perating Schedule: 8-12 hrs/shift 1 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1,995 million	$29,216
Natural Gas	7,870 million	23,827
Total	9,865 million	$53,043

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Lighting Modifications	Electricity	393 million	1865
2	Temperature Setback	Electricity	22.2 million	325
3	Dock Seals	Natural Gas	282 million	824
4	High Efficiency Motors	Electricity	131 million	621
5	Recirculate Exhaust	Natural Gas	101 million	306
	TOTAL		929.2 million	3971

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 2401 Location: Trenton, Ga. Principal Product Types Dressed Lumber

ployment: 30 Date(s) of Audits: 2-19-80

proximate Annual Unit Production: 3 - 4 million board feet

proximate Annual Sales: _____

erating Schedule: 8 hrs/shift 1 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1,768 million	$ 28,785
Natural Gas	23,965 million	56,485
Total	25,733 million	$ 85,270

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Eliminate Steam Leaks	Natural Gas	4.38×10^8	1033
2	Repair Steam Trap	" "	2.69×10^8	635
3	Insulate Steam Pipes	" "	5.31×10^8	1253
4	Wood Fired Boiler	" "	2.4×10^{10}	56485
5	High Efficiency Motors	Electricity	1.11×10^8	1801
			$25,349 \times 10^6$	61207

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D3502 Location: Norcross, Ga Principal Product Types Wire Fabrication

ployment: 70 Date(s) of Audits: 3/7, 3/11, 3/18

proximate Annual Unit Production: Unknown

proximate Annual Sales: Unknown

erating Schedule: 8 hrs/shift 2 shifts/day 250 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Natural Gas	5568×10^6	$15,000
Electricity	7298×10^6	29,000
Total		

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Heat Recovery from spray washer	Gas	393×10^6	$ 1,100
2	Reduce Air Pressure	Electricity	439×10^6	1,713
3	Relocate Air Intakes	Electricity	44×10^6	171
4	Heat Recovery from air Compressor	Gas	274×10^6	767
5	Energy Efficient Flourescent	Electricity	38×10^6	1,509
6	Demand Reduction			2,465
			$1,536 \times 10^6$	$7,725

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 2202 Location: Dalton, Ga Principal Product Types Carpet Finishing

ployment: 50 Date(s) of Audits: 2/11/80, 2/28/80, 3/13/80

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 8 hrs/shift 3 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	$6,593X10^6$	$ 66,107
Natural Gas	$158,867X10^6$	382,926
Propane	$20,333X10^6$	86,485
No. 5 Oil	$10,333X10^6$	27,106
Total	$196,126 X 10^6$	$562,624

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Steam Coils in Dye Becks	Nat. Gas & No. 5 oil	$49.9X10^9$	120,758
2	Doors on Becks	" " " " " "	$3.13X10^9$	7,575
3	Lower controller setpoint	" " " " " "	$13.3X10^9$	32,186
4	Waste Water Heat Rec.	" " " " " "	$75.5X10^9$	182,700
5	Improve Dryer Eff.	Propane	$6.89X10^9$	29,282
6	Dock Door Seals	"	$1.56X10^9$	6,633
7	Steam Leaks	Nat. Gas & No. 5 Oil	$235X10^6$	570
		Total	$150.3X10^9$	$379,704

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D2501 Location: Clayton, Ga. Principal Product Types Metal Products

ployment: 50 Date(s) of Audits: 2/15/80

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 8 hrs/shift 3 shifts/day 300 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1.488×10^9	$23,283
No. 2 Fuel Oil	1.589×10^9	7,210
Total	3.077×10^9	$30,493

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Improve Boiler	No. 2 Fuel	1.25×10^8	564
	Combustion Efficiency			
2	Reduce Electricity Cost	Electricity	-	2804
	by limiting maximum demand			
3	Insulate Bare Pipes	No. 2 Fuel	3.84×10^7	174
4	Replace Existing Lamps	Electricity	2.21×10^7	345
	with energy efficient lamps			
		Total	1.86×10^8	3887

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D3901 Location: N. Ga. Principal Product Types Ind. Laundry

ployment: 70 Date(s) of Audits: March, 1980

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 11 hrs/shift 1 shifts/day 300 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Natural Gas	$27,883 \times 10^6$	$72,000
Electricity	$5,146 \times 10^6$	21,000
Total	$33,029 \times 10^6$	$93,000

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
2	Use Warm Comb Air	Gas	365	940
3	Min. air pres	Elect	46.5	208
4	Relocate air intake	Elect	14.7	66
7	Low wattage lighting	Elect	37.2	168
			463.4×10^6	$1,382

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 2402 Location: Clarkesville, GA Principal Product Types Furniture, Millwork

ployment: 5 Date(s) of Audits: 3/4/80

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 8 hrs/shift 1 shifts/day 275 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	18.54×10^6	$488.38
Total	18.54×10^6	$488.38

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Heat with Sawdust	--	6.55×10^7	--
2	Electric Motor Controllers	Electricity	?	?

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 2203 Location: Rome, Ga. Principal Product Types Raw stock dyeing

ployment: 80 Date(s) of Audits: 2/26 and 3/3

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 8 hrs/shift 3 shifts/day 3/2 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	893 million	$ 15,667
Natural Gas	21,605 "	57,010
#2 Fuel Oil	960 "	5,868
Total	23,458 million	$ 78,545

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Return Condensate	Nat. Gas & No. 2 oil	$1,690 \times 10^6$	4,715
2	Heat Recovery from			
	waste water	" " " " "	$4,270 \times 10^6$	11,913
3	Insulate steam pipes	" " " " "	668×10^6	1,865
4	Steam leaks	" " " " "	812×10^6	2,265
5	Hot water leak	" " " " "	133×10^6	371
	Total		$7,573 \times 10^6$	21,129

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 3001 Location: Oakwood, Ga Principal Product Types Telephone Enclosures

ployment: 49 Date(s) of Audits: 4/8/80

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 10 hrs/shift 1 shifts/day 208 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1698 million	$ 21,727
Natural Gas	1406 million	3,927
Total	3104 million	25,654

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Improve light efficiency	Electricity	483×10^6	6,380
2	Exhaust Heat Recovery	Natural gas	462×10^6	1,289
3	Insulate Tanks	Natural gas	91.6×10^6	256
4	Insulate Duct	Natural gas	38.3×10^6	107
5	Air Compressor Intakes	Electricity	11.2×10^6	132
6	Paint Roof	Electricity	9.6×10^6	150
	Totals		1096×10^6	8314

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 2001 Location: Gainesville, Ga Principal Product Types Animal Feeds

ployment: 66 Date(s) of Audits: 4/11/80

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 8 hrs/shift 2 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	$13,151 \times 10^6$	$153,674
Natural Gas	$33,076 \times 10^6$	86,066
No. 2 Fuel Oil	$1,555 \times 10^6$	4,953
Total	$47,782 \times 10^6$	$244,693

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Compressor Air Intake	Electricity	14×10^6	164
2	Steam Leaks	Nat Gas & No 2 Oil	112×10^6	294
3	High Efficiency Motors	Electricity	104×10^6	1221
	Total		230×10^6	1679

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 2205 Location: Dalton, Ga Principal Product Types Carpet

ployment: 155 Date(s) of Audits: 4/29/80, 5/12/80

proximate Annual Unit Production:

proximate Annual Sales:

erating Schedule: 10 hrs/shift 1 shifts/day 208 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year $
Electricity	$6,242 \times 10^6$	64,220
Propane	$27,008 \times 10^6$	101,620
Total	33,250	165,840

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Eliminate Steam Leaks	Propane	30.3×10^6	114
2	High Efficiency Lamps	Electricity	65.6×10^6	673
3	Insulate Bare Pipes	Propane	200×10^6	752
4	Optimize Curing Oven	Propane	2070×10^6	7790
			$2,366 \times 10^6$	9329

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D 2206 Location: Chatsworth Principal Product Types Draperies Bedspreads

ployment: 75 Date(s) of Audits: 5/19/80

proximate Annual Unit Production:

proximate Annual Sales:

erating Schedule: 8 hrs/shift 1 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	3,732 million	$ 52,534
Natural Gas	64,000 million	145,210
#5 Oil	28,330 million	75,919
Total	96,062 million	$273,663

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	High Efficiency Lighting	Electricity	135 million	1,897
2	Steam Leaks	Nat. Gas & No. 5 Oil	303 million	724
3	Insulate Steam Pipes	" " " " " "	1660 million	3,967
4	Waste Water Heat Recov.	" " " " " "	18700 "	44,693
5	Install Covers over			
	Dye Becks	" " " " " "	873 "	2,086
	Total		21,671 million	53,367

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

ant Code: D2207 Location: Calhoun Principal Product Types Bedspread

ployment: 60 Date(s) of Audits: May 27, 1980

proximate Annual Unit Production: _____

proximate Annual Sales: _____

erating Schedule: 8 hrs/shift 2 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	4264 million	$ 27,466
Natural Gas	6051 million	16,754
Total	10,315 million	44,220

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Improve lighting eff.	electricity	150 million	$ 966
2	Move compressor intake	electricity	20 million	130
3	Lower air pressure	electricity	79 million	512
	Total		249 million	$1,608

QUARTERLY PROGRESS REPORT

APPALACHIAN REGIONAL COMMISSION

ENERGY CONSERVATION PROGRAM

July 1, 1980 - September 30, 1980

SUBMITTED TO:

GEORGIA OFFICE OF ENERGY RESOURCES

AND THE APPALACHIAN REGIONAL COMMISSION

ARC Contract No. 79-176
Ga. OER Contract No. 169
Ga. Tech Project No. A-2535

October 1, 1980

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

3RD QUARTER ACTIVITY

Reporting Period: July 1, 1980 - September 30, 1980

1. Plant Energy Surveys:

- The following table summarizes activities for the previous and current quarters:

Plant Code	Dates of Plant Visits	Date of Report	Recommended Energy Savings BTU x 10^6	$
D2201	1/10	2/22	929.2	3,971
Follow-up:	4/18	6/6	6,235	18,705
D2202	2/11, 2/28 3/13, 4/7	3/31	150,300	379,704
D2501	2/13	3/24	186	3,887
D2401	2/19	3/10	25,349	61,207
D2203	2/26,3/3	4/4	7,573	21,129
D2402	3/4	4/4	65.5	910
D3502	3/7, 3/11, 3/18	3/20	1,536	7,725
D3901	3/19	4/1	463.4	1,382
D3001	4/8	4/21	1,096	8,314
D2001	4/11	4/28	230	1,679
D2204	4/23, 5/14	7/15	1,881	21,194
D2205	4/29, 5/12	5/30	2,366	9,329
D2206	5/19	6/12	21,671	53,367
D2207	5/27	6/13	249	1,608
D3401	6/11	9/12	3,956	12,059
D2208	6/9	7/18	33,448	85,991
D2002	6/9	7/1	593	4,181
D2209	6/24	8/21	15,015	68,817
D3201	6/27, 7/10	9/12	2,630	9,005
D3202	7/8			
D3203	7/10, 7/17	7/30	33.4	235
D2502	7/24			
D3002	7/28	8/18	199.8	2,726
D3003	7/28			
D2503	9/18			
Total to Date			276,005.3	777,125

- A total of 27 plant visits and 25 plant surveys have been conducted and 21 survey reports have been completed as of September 30, 1980
- The attached list of audited plants contains general information on each plant. A detailed listing of energy conservation recommendations is included in Appendix A.

2. Energy Conservation Workshops:

   - The first of two energy conservation workshops was conducted at the Georgia Mountains Center in Gainesville, Georgia on September 30. The workshop was well received by all participants. The final agenda and a list of attendees is included in Appendix B.
   - An industrial energy conservation handbook was presented to each attendee. Copies of the handbook are attached to this report.
   - The second workshop will be held in Calhoun, Georgia on October 21. Brochures announcing the workshops were mailed to approximately 1500 companies in the Georgia Appalachian region. A copy of the brochure is included in Appendix B.

3. Other Activities:

   - Work is continuing on the development of a computer program to perform statistical analyses of the results from the plant surveys. This program will facilitate preparation of the final report and aid in monitoring the progress of the program.

4. Plans For Fourth Quarter:

   - Five plant surveys will be conducted and all remaining survey reports will be completed by October 31.
   - The second energy conservation workshop will be conducted on October 21.
   - Evaluation of the results of the workshops and plant surveys will be carried out through personal visits and telephone interviews.
   - A draft final report will be issued by November 30.

ARC ENERGY CONSERVATION PROGRAM

Summary of Surveyed Plants

Company D 2201
Location: Dalton (Whitfield)
Employment: 50
Carpet Tufting 2272

Company D 2202
Location: Dalton (Whitfield)
Employment: 50
Carpet Finishing 2272

Company D 3501
Location: Dalton (Whitfield)
Employment: 63
Textile Machinery & Equip. 3552

Company D 2501
Location: Clayton (Rabun)
Employment: 50
Metal Display Racks 2542
Aircraft Components 3728
Nuclear Components 3322

Company D 2401
Location: Trenton (Dade)
Employment: 45
Softwood Rough Lumber 2421
Softwood Dressed Lumber 2421

Company D 2203
Location: Rome (Floyd)
Employment: 80
Raw Stock Dyeing & Blending 2261

Company D 2402
Location: Clarkesville (Habersham)
Employment: 5
Custom Cabinet Work 2434
Millwork 2431
Wood Pallets 2448

Company D 3502
Location: Norcross (Gwinnett)
Employment: 100
Egg Merc. & Handling Systems 3551
Air Curtain Refrig. 3585
Wire Racks & Guards 3469
Custom Metal Fabrication 3441

Company D 3901
Location: Rome (Floyd)
Employment: 70
Industrial Laundry 3900

Company D 3001
Location: Oakwood (Hall)
Employment: 49
Telephone Enclosures: 3079
Plastic Sheet Extrusions 3079

Company D 2001
Location: Gainesville (Hall)
Employment: 66
Poultry Feeds: 2048
Dairy Feeds 2048
Hog Chows 2048

Company D 2204
Location: Douglasville (Douglas)
Employment: 130
Synthetic Carpet Yarn 2281

Company D 2205
Location: Dalton (Whitfield)
Employment: 155
Room Size Rugs 2272
Scatter Rugs 2279

Company D 2206
Location: Chatsworth (Murray)
Employment: 75
Bedspread 2392
Draperies 2391

Company D 2207
Location: Calhoun (Gordon)
Employment: 60
Bedspreads 2392
Draperies 2391

Company D 3401
Location: Gainesville (Hall)
Employment: 170
Aluminum Hardware & Trim 3429
Shelf Studs & Brackets 3429

Company D 2208
Location: Cartersville (Bartow)
Employment: 155
Carpet 2272

Company D 2002
Location: Gainesville (Hall)
Employment: 100
Institutional Foods 2013
Block & Crushed Ice 2097

Company D 2209
Location: Sugar Valley (Gordon)
Employment: 85
Nylon Yarn 2281

Company D 3201
Location: Adairsville (Bartow)
Employment: 37
Quarry Tile 3253

Company D 3202
Location: Cartersville (Bartow)
Employment: 96
Mineral Extenders & Fillers 3295

Company D 3203
Location: Ellijay (Gilmer)
Employment: 12
Concrete Blocks 3271
Ready Mixed Concrete 3273

Company D 2502
Location: Lawrenceville (Gwinnett)
Employment: 55
Wood Dinette Sets 2511
Wood Rockers 2511

Company D 3002
Location: Dawsonville (Dawson)
Employment: 18
Metal Braided Fuel Line 3079
Window Gasketing 3069

Company D 3003
Location: Lawrenceville (Gwinnett)
Employment: 40
Polyethylene 3079

Company D 2503
Location: Cumming (Forsyth)
Employment: 22
Telephone Booths 2542

Appendix A - Survey Report Summary Data Sheets

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D-2201 **Location:** Dalton **Principal Product Types** Carpet

Employment: 50 **Date(s) of Audits:** 1/10/80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 8-12 hrs/shift 1 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1,995 million	$29,216
Natural Gas	7,870 million	23,827
Total	9,865 million	$53,043

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Lighting Modifications	Electricity	393 million	1865
2	Temperature Setback	Electricity	22.2 million	325
3	Dock Seals	Natural Gas	282 million	824
4	High Efficiency Motors	Electricity	131 million	621
5	Recirculate Exhaust	Natural Gas	101 million	306
	TOTAL		929.2 million	3971

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2401 **Location:** Trenton, Ga. **Principal Product Types** Dressed Lumber

Employment: 30 **Date(s) of Audits:** 2-19-80

Approximate Annual Unit Production: 3 - 4 million board feet

Approximate Annual Sales:

Operating Schedule: 8 **hrs/shift** 1 **shifts/day** 260 **days/year**

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1,768 million	$ 28,785
Natural Gas	23,965 million	56,485
Total	25,733 million	$ 85,270

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Eliminate Steam Leaks	Natural Gas	4.38×10^8	1033
2	Repair Steam Trap	" "	2.69×10^8	635
3	Insulate Steam Pipes	" "	5.31×10^8	1253
4	Wood Fired Boiler	" "	2.4×10^{10}	56485
5	High Efficiency Motors	Electricity	1.11×10^8	1801
	Total		$25,349 \times 10^6$	$61207

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D3502 **Location:** Norcross, Ga **Principal Product Types** Wire Fabrication

Employment: 70 **Date(s) of Audits:** 3/7, 3/11, 3/18

Approximate Annual Unit Production: Unknown

Approximate Annual Sales: Unknown

Operating Schedule: 8 hrs/shift 2 shifts/day 250 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Natural Gas	5568×10^6	$15,000
Electricity	7298×10^6	29,000
Total		

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Heat Recovery from spray washer	Gas	393×10^6	$ 1,100
2	Reduce Air Pressure	Electricity	439×10^6	1,713
3	Relocate Air Intakes	Electricity	44×10^6	171
4	Heat Recovery from air Compressor	Gas	274×10^6	767
5	Energy Efficient Flourescent	Electricity	38×10^6	1,509
6	Demand Reduction			2,465
	Total		$1,536 \times 10^6$	$7,725

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2202 **Location:** Dalton, Ga **Principal Product Types** Carpet Finishing

Employment: 50 **Date(s) of Audits:** 2/11/80, 2/28/80, 3/13/80

Approximate Annual Unit Production: _____

Approximate Annual Sales: _____

Operating Schedule: 8 hrs/shift 3 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	$6,593X10^6$	$ 66,107
Natural Gas	$158,867X10^6$	382,926
Propane	$20,333X10^6$	86,485
No. 5 Oil	$10,333X10^6$	27,106
Total	$196,126 \times 10^6$	$562,624

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Steam Coils in Dye Becks	Nat. Gas & No. 5 oil	$49.9X10^9$	120,758
2	Doors on Becks	" " " " " "	$3.13X10^9$	7,575
3	Lower controller setpoint	" " " " " "	$13.3X10^9$	32,186
4	Waste Water Heat Rec.	" " " " " "	$75.5X10^9$	182,700
5	Improve Dryer Eff.	Propane	$6.89X10^9$	29,282
6	Dock Door Seals	"	$1.56X10^9$	6,633
7	Steam Leaks	Nat. Gas & No. 5 Oil	$235X10^6$	570
		Total	$150.3X10^9$	$379,704

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D2501 **Location:** Clayton, Ga. **Principal Product Types** Metal Products

Employment: 50 **Date(s) of Audits:** 2/13/80

Approximate Annual Unit Production: _____

Approximate Annual Sales: _____

Operating Schedule: 8 hrs/shift 3 shifts/day 300 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1.488×10^9	$23,283
No. 2 Fuel Oil	1.589×10^9	7,210
Total	3.077×10^9	$30,493

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Improve Boiler Combustion Efficiency	No. 2 Fuel	1.25×10^8	564
2	Reduce Electricity Cost by limiting maximum demand	Electricity	-	2804
3	Insulate Bare Pipes	No. 2 Fuel	3.84×10^7	174
4	Replace Existing Lamps with energy efficient lamps	Electricity	2.21×10^7	345
		Total	1.86×10^8	3887

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D3901 **Location:** N. Ga. **Principal Product Types** Ind. Laundry

Employment: 70 **Date(s) of Audits:** March, 1980

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 11 hrs/shift 1 shifts/day 300 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Natural Gas	$27,883 \times 10^6$	$72,000
Electricity	$5,146 \times 10^6$	21,000
Total	$33,029 \times 10^6$	$93,000

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
2	Use Warm Comb Air	Gas	365	940
3	Min. air pres	Elect	46.5	208
4	Relocate air intake	Elect	14.7	66
7	Low wattage lighting	Elect	37.2	168
	Total		463.4×10^6	$1,382

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2402 **Location:** Clarkesville, GA **Principal Product Types** Furniture, Millwo

Employment: 5 **Date(s) of Audits:** 3/4/80

Approximate Annual Unit Production: _____

Approximate Annual Sales: _____

Operating Schedule: 8 hrs/shift 1 shifts/day 275 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	18.54×10^6	$488.38
Total	18.54×10^6	$488.38

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Heat with Sawdust	--	6.55×10^7	--
2	Electric Motor Controllers	Electricity	?	?

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2203 **Location:** Rome, Ga. **Principal Product Types** Raw stock dyeing

Employment: 80 **Date(s) of Audits:** 2/26 and 3/3

Approximate Annual Unit Production: _____

Approximate Annual Sales: _____

Operating Schedule: 8 hrs/shift 3 shifts/day 312 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	893 million	$ 15,667
Natural Gas	21,605 "	57,010
#2 Fuel Oil	960 "	5,868
Total	23,458 million	$ 78,545

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Return Condensate	Nat. Gas & No. 2 oil	$1,690 \times 10^6$	4,715
2	Heat Recovery from			
	waste water	" " " " "	$4,270 \times 10^6$	11,913
3	Insulate steam pipes	" " " " "	668×10^6	1,865
4	Steam leaks	" " " " "	812×10^6	2,265
5	Hot water leak	" " " " "	133×10^6	371
	Total		$7,573 \times 10^6$	21,129

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 3001 **Location:** Oakwood, Ga **Principal Product Types** Telephone Enclos

Employment: 49 **Date(s) of Audits:** 4/8/80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 10 hrs/shift 1 shifts/day 208 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	1698 million	$ 21,727
Natural Gas	1406 million	3,927
Total	3104 million	25,654

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Improve light efficiency	Electricity	483×10^6	6,380
2	Exhaust Heat Recovery	Natural gas	462×10^6	1,289
3	Insulate Tanks	Natural gas	91.6×10^6	256
4	Insulate Duct	Natural gas	38.3×10^6	107
5	Air Compressor Intakes	Electricity	11.2×10^6	132
6	Paint Roof	Electricity	9.6×10^6	150
	Totals		1096×10^6	8314

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2001 **Location:** Gainesville, Ga **Principal Product Types** Animal Feeds

Employment: 66 **Date(s) of Audits:** 4/11/80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 8 hrs/shift 2 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	$13,151 \times 10^6$	$153,674
Natural Gas	$33,076 \times 10^6$	86,066
No. 2 Fuel Oil	$1,555 \times 10^6$	4,953
Total	$47,782 \times 10^6$	$244,693

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Compressor Air Intake	Electricity	14×10^6	164
2	Steam Leaks	Nat Gas & No 2 Oil	112×10^6	294
3	High Efficiency Motors	Electricity	104×10^6	1221
	Total		230×10^6	1679

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2205 **Location:** Dalton, Ga **Principal Product Types** Carpet

Employment: 155 **Date(s) of Audits:** 4/29/80, 5/12/80

Approximate Annual Unit Production: _____

Approximate Annual Sales: _____

Operating Schedule: 10 hrs/shift 1 shifts/day 208 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year $
Electricity	$6,242 \times 10^6$	64,220
Propane	$27,008 \times 10^6$	101,620
Total	33,250	165,840

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Eliminate Steam Leaks	Propane	30.3×10^6	114
2	High Efficiency Lamps	Electricity	65.6×10^6	673
3	Insulate Bare Pipes	Propane	200×10^6	752
4	Optimize Curing Oven	Propane	2070×10^6	7790
	Total		$2,366 \times 10^6$	9329

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2206 **Location:** Chatsworth **Principal Product Types** Draperies Bedspreads

Employment: 75 **Date(s) of Audits:** 5/19/80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 8 hrs/shift 1 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	3,732 million	$ 52,534
Natural Gas	64.000 million	145,210
#5 Oil	28.330 million	75.919
Total	96,062 million	$273,663

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	High Efficiency Lighting	Electricity	135 million	1,897
2	Steam Leaks	Nat. Gas & No. 5 Oil	303 million	724
3	Insulate Steam Pipes	" " " " " "	1660 million	3,967
4	Waste Water Heat Recov.	" " " " " "	18700 "	44,693
5	Install Covers over			
	Dye Becks	" " " " " "	873 "	2,086
	Total		21,671 million	53,367

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D2207 **Location:** Calhoun **Principal Product Types** Bedspread

Employment: 60 **Date(s) of Audits:** May 27, 1980

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 8 hrs/shift 2 shifts/day 260 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	4264 million	$ 27,466
Natural Gas	6051 million	16,754
Total	10,315 million	44,220

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Improve lighting eff.	electricity	150 million	$ 966
2	Move compressor intake	electricity	20 million	130
3	Lower air pressure	electricity	79 million	512
	Total		249 million	$1,608

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D2002 **Location:** Gainesville **Principal Product Types** Food

Employment: 100 **Date(s) of Audits:** June 16,1980

Approximate Annual Unit Production: N/A

Approximate Annual Sales: N/A

Operating Schedule: 8 hrs/shift 1 shifts/day 250 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	8.9×10^9	$32,945
Natural gas	592.8×10^6	$1,866
Total	9.5×10^9	$34,811

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	High pressure sodium	electricity	not recommended	
2	Flourescent lights	electricity	underermined	
3	Low wattage fluorescent	electricity	undetermined	
4	Air Curtain	electricity	2400 BTU/MIN	$.027/ Min.
5	Waste Heat Recovery	natural gas	592.8 E6	$1,866
6	15% Peak Shaving	natural gas	undetermined	$2,315
	Total		592.8	$4181

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2204 **Location:** Douglasville **Principal Product Types** Carpet Yarn

Employment: 130 **Date(s) of Audits:** 4/23/80 - 5/14/80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 8 **hrs/shift** 3 **shifts/day** 312 **days/year**

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	$21,121 \times 10^6$	$200,393
Natural Gas	$7,517 \times 10^6$	22,246
Total	$28,638 \times 10^6$	$222,639

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	High Efficiency Lamps	Electricity	614×10^6	$ 5,868
2	Turn Off HVAC Equipment	"	563×10^6	5,380
3	O.A. Damper Leakage	"	124×10^6	1,187
4	Enthalpy Economizer	"	580×10^6	5,546
5	Demand Control	"	-	3,213
	Total		1881×10^6	$21,194

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D-2208 **Location:** Cartersville **Principal Product Types** Carpet

Employment: 155 **Date(s) of Audits:** 6-9-80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 8 **hrs/shift** 3 **shifts/day** 260 **days/year**

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	7580 million	74,274
Natural Gas	163,664 million	392,328
Propane	10,692 million	49,024
Total	181,936 million	515,626

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Enclose Dye Becks	Natural Gas/Propane	$5,230 \times 10^6$	13,239
2	Turn Off Exhaust Fans	Natural Gas/Propane/Electric	$2,120 \times 10^6$	6,726
3	Insulate Steam Pipe	Natural Gas/Propane	27.4×10^6	69
4	Correct Steam Leaks	Natural Gas/Propane	38×10^6	96
5	Optimize Curing Oven	Natural Gas/Propane	$4,800 \times 10^6$	12,143
6	Improve Dryer Efficiency	Natural Gas/Propane	$3,999 \times 10^6$	10,116
7	Waste Water Heat Recovery	Natural Gas/Propane	$16,700 \times 10^6$	42,251
8	Dock Seals		534×10^6	1,351
	TOTAL		$33,448.4 \times 10^6$	85,991

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D3203 **Location:** North Georgia **Principal Product Types** Concrete Block

Employment: 12 **Date(s) of Audits:** July, 1980

Approximate Annual Unit Production: N/A

Approximate Annual Sales: N/A

Operating Schedule: 8 hrs/shift 1 shifts/day 250 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Fuel Oil	1220×10^6	$6,778
Electricity	406×10^6	2,867
Total	1627×10^6	$9.645

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Lower air pressure	Electricity	17.62×10^6	$124
2	Check for air leaks	Electricity	-	-
3	Disconnect burned out lights	"	15.75×10^6	$111
4	Group replacement of fluorescent lights	-	-	-
5	Energy efficient fluorescent lights	Electricity		
	Total		33.37	$235

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 2209 **Location:** Sugar Valley **Principal Product Types** Carpet Yarn

Employment: 85 **Date(s) of Audits:** 6/24/80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 12 hrs/shift 2 shifts/day 365 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	$16,677 \times 10^6$	$136,094
Natural Gas	$61,564 \times 10^6$	$179,844
No. 2 Fuel Oil	602×10^6	$ 2,623
Total	$78,843 \times 10^6$	$318,561

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	High Efficiency Lights	Electricity	201×10^6	$ 1,651
2	Insulate Steam Pipe	Nat. Gas/No. 2 Oil	151×10^6	561
3	Exhaust Heat Recovery	Electricity	$4,400 \times 10^6$	36,100
4	Exhaust Heat Recovery	Nat. Gas/No. 2 Oil	$10,200 \times 10^6$	29,990
5	Reset Condenser Water	Electricity	62.8×10^6	515
	Temperature			
	Total		15014.8×10^6	$68,817

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D 3002 Location: Dawsonville, Ga. Employment: 18

Principal Products: Metal Braided Fuel Line, Tubing 3079

Window Gasketing 3069

Approximate Annual Unit Production: _____

Approximate Annual Sales: _____ Date(s) of Audits: 7-28-80

Operating Schedule: 16 hrs/day 5 days/wk 50 wks/yr (4000 hrs/yr)

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/Year
Electricity	1698×10^6	$27,268
#2 Fuel Oil	947×10^6	5,123
Total	2645×10^6	$32,391

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Boiler Tune-up	#2 Oil	46.2×10^6	250
2	Turn Out Lights	Electricity	13.4×10^6	216
3	Replace Incand. Lts.	"	57.3×10^6	924
4	Insulate Salt Tank	"	82.9×10^6	1336
	Total		199.8×10^6	2726

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D3201 **Location:** Adairsville **Principal Product Types** Quarry Tile

Employment: 37 **Date(s) of Audits:** June 27, 1980, July 10, 1980

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: Kiln: 24 **hrs/shift** 1 **shifts/day** 365 **days/year**

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	3,488 million	$ 48,618
Natural Gas	17,202 million	$ 57,256
Propane	413 million	$ 2,692
Total	21,103 million	$108,566

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	Heat Exchanger	Natural Gas	2600 million	8,580
2	High Efficiency Motors	Electricity	30 million	425
	Total		2630 million	9,005

ENERGY CONSERVATION SURVEY REPORT

Summary Data Sheet

Plant Code: D3401 **Location:** Gainesville **Principal Product Types** Aluminum Extrusi

Employment: 150 **Date(s) of Audits:** 6/11/80, 7/16/80

Approximate Annual Unit Production:

Approximate Annual Sales:

Operating Schedule: 10 hrs/shift 2 shifts/day 200 days/year

Current Annual Energy Usage

Fuel Type	Consumption in BTUs/year	Cost/year
Electricity	13,560 million	$174,028
Natural Gas	13,811 "	37,312
Total	27,371 million	$211,340

Energy Conservation Opportunities (ECOs)

#	Description	Conserved Fuel	SAVINGS IN BTU	SAVINGS IN $
1	High Efficiency Ltg.	Electricity	123×10^6	1,584
2	Plastic Strip Doors	Natural Gas	189×10^6	637
3	Insulate Pipes	Natural Gas	380×10^6	1,026
4	Insulate tank surface	Natural Gas	$1,990 \times 10^6$	5,373
5	Boiler Tune-up	Natural Gas	905×10^6	2,443
6	Heat Recovery from	Natural Gas	369×10^6	996
	Extruder			
	Total		$3,956 \times 10^6$	12,059

Appendix B - Workshop Announcement

Workshop Agenda (Gainesville)

List of Attendees

ARC INDUSTRIAL ENERGY CONSERVATION WORKSHOP

September 30, 1980

Gainesville, Ga.

9:00 a.m.	OPENING REMARKS Doug Moore - Georgia Tech EES Phil Whitlow - Ga. Dept. of Community Affairs Phil Loveless - Ga. Tech EES - Industrial Extension Div.
9:15 a.m.	ENERGY MANAGEMENT Doug Moore
9:30 a.m	BOILERS & STEAM SYSTEMS Norris Garmon
10:20 a.m.	BREAK
10:35 a.m.	HEATING, VENTILATION & AIR CONDITIONING Doug Moore
11:10 a.m.	THERMAL INSULATION Norris Garmon
11:45 a.m.	LUNCH
12:45 p.m.	LIGHTING & ELECTRICAL POWER Larry Banta
1:35 p.m.	HEAT RECOVERY David Keith
2:25 p.m.	BREAK
2:35 p.m.	CASE STUDIES
3:15 p.m.	GENERAL DISCUSSION
3:30 p.m.	ADJOURN

ATTENDEES

INDUSTRIAL ENERGY CONSERVATION WORKSHOP

GAINESVILLE

September 30, 1980

Garlin Brookshire
Scovill, Inc.
P. O. Box 44
Clarkesville, GA 30523

Roy Channell
AMF - Potter & Brumfield Division
P. O. Drawer C
Gainesville, GA 30501

Al Chieves
Burlington Industries
Rabun Plant
Rabun Gap, GA 30568

Phillip D'entremont
Scovill, Inc.
P. O. Box 44
Clarkesville, GA 30523

Lynn Williams
Computer Measurements & Controls
P. O. Box 86
Oakwood, GA 30566

Jack W. Meaders
Ames Textile Corporation
P. O. Box 218
Cleveland, GA 30528

Ernest Wendell Cross
City Engineer
P. O. Box 2496
Gainesville, GA 30503

Joe C. Pendergrass
Wallace Co.
831 Dorsey Street
Gainesville, GA 30501

ENERGY CONSERVATION ASSISTANCE TO GEORGIA APPALACHIAN INDUSTRIES

FINAL REPORT - 1980

GEORGIA INSTITUTE OF TECHNOLOGY

Submitted To:
Georgia Office of Energy Resources
and the Appalachian Regional Commission

Prepared By:
Douglas M. Moore
Larry E. Banta

Georgia Institute of Technology
Engineering Experiment Station
Atlanta, Georgia 30332

December, 1980

DISCLAIMER

This report represents the opinion of the authors. It carries no official endorsement by Georgia Institute of Technology.

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

This report summarizes the activities of the Energy Conservation Division of Georgia Tech's Engineering Experiment Station under an industrial energy conservation program sponsored by the Appalachian Regional Commission and administered by the State of Georgia Office of Energy Resources. Under this program, in-plant energy surveys have been provided to thirty small manufacturing firms with 200 employees or less in the Appalachian region of Georgia, and two energy conservation workshops were conducted. Case studies of two ARC surveyed plants were distributed to over 6000 manufacturers in the state.

The thirty manufacturing plants surveyed consume a total of 1.35 trillion BTU's of energy anually, at a cost of over 5.4 million dollars. The survey reports contain 137 conservation recommendations estimated to save 370 billion BTU's and more than 1 million dollars at current energy costs ($33,000 average savings per plant). As of the date of this report, these plants report that they have implemented 81 of these recommendations. The estimated savings accomplished amount to 102 billion BTU's and $340,000 ($11,300 average savings per plant).

Although accomplishments under this program have been substantial, less than 2% of the industrial population of the region has been reached. If this program could be expanded to reach 50 percent of the industrial population, the potential energy savings could amount to 9.3 trillion BTU's with a corresponding cost savings of 23.6 million dollars.

II. INTRODUCTION

Conservation is an essential element of our national energy program, and has often been considered to be the most immediate, practical, and cost effective means of reducing our dependence on imported oil and preventing future energy shortages. The Energy Conservation Division of the Technology Applications Laboratory, a major organizational branch of the Georgia Tech Engineering Experiment Station, has been heavily involved in the field of industrial energy conservation since 1977. Through this ARC sponsored program, engineers have provided valuable technical assistance to small manufacturers with 200 employees or less in the 35 county Appalachian region of Georgia.

The primary goal of the program has been assisting area industries in reducing or at least containing their spiraling energy costs. The major efforts of the program were concentrated in two primary activities: (1) in-plant energy surveys followed by written survey reports, and (2) technical information transfer through workshops and case studies..

A total of thirty in-plant energy surveys were conducted and reports prepared. Because of the small size of the companies involved, a one-day visit was normally adequate, although in almost half of the cases follow-up visits were made to gather additional information or to present the survey results. Emphasis was placed on recommendations requiring little or no capital expense such as turning out lights or resetting controls, although the greatest savings normally resulted from more capital intensive projects. The surveys were very effective in terms of the energy savings accomplished, as explained in detail in section III of this report.

In order to reach a broader audience, two industrial energy conservation workshops were held in the region. In addition, two case studies of plants surveyed under the program were presented

in the Conserver, a bi-monthly newsletter produced by Georgia Tech under the IEES (Industrial Energy Extension Service) program, a statewide conservation program sponsored by the State of Georgia Office of Energy Resources. Copies of these articles are included in section IV of this report.

Annual energy consumption by the industrial sector of the Georgia Appalachian Region amounted to approximately 68 trillion BTU's (in 1978), or roughly 29% of the total energy consumption of the region. The total energy consumption of the 30 plants surveyed amounts to 1.35 trillion BTU's, or about 2 percent of the area's total industrial consumption. A survey of the industrial population indicates that there are approximately 1800 manufacturing plants in the region. The thirty plants surveyed under this program represent only 1.7 percent of this population. Although the energy and cost savings obtained under the program are substantial, they represent only a very small portion of the potential savings that might be realized.

In order to facilitate comparison of various types of energy, a common energy unit, BTU, is used in this report. The abbreviation MMBTU is used to indicate million BTU's.

III. PLANT ENERGY SURVEYS

A total of thirty energy surveys were completed during 1980. Client companies were selected through one of two channels: direct requests from companies who had learned of the program and contacted Georgia Tech; and by random telephone solicitation. A tri-fold brochure announcing the program was prepared and distributed to over 1500 area manufacturers. Any company requesting an energy survey was given one; however, over half of the audits were scheduled by calling prospective clients, informing the appropriate company official of the service, and offering to perform an audit. Response to this approach was good in that no trouble was encountered in finding companies who wanted to take advantage of the program.

Although no statistics on this aspect were kept, it is felt that the companies requesting assistance were more likely to implement the suggestions made in the audit report than those companies for which Georgia Tech made the initial effort. On the other hand, solicitation of selected companies allowed emphasis to be placed on the larger or more energy intensive industries where much higher energy savings per sponsor dollar are possible.

Description of Surveyed Plants

Table III-1 provides a breakdown of the mix of industries for which ARC audits were performed. The textile industry dominates as a reflection of two factors, (1) it is one of the largest industry groups in the state, especially in the Appalachian Region, and (2) it is a very energy intensive industry with which Georgia Tech researchers have much experience and a good working relationship. Table III-2 gives a picture of the range of company sizes for which work was done. The average plant employed about 80 people and worked two shifts per day year-round.

The thirty plants spent a combined total of $5.4 million for more than 1.35 trillion BTU of energy last year. Table III-3 breaks this useage down by fuel type and shows that more than 80% of the BTU consumption was of "thermal" fuel: natural gas, propane, or oil. Slightly less than 20% of the BTU's consumed were supplied by electricity but due to its high cost, relative to other energy forms, it accounted for nearly 45% of the total energy costs of the companies visited.

TABLE III-1

PROFILE OF AUDITED COMPANIES

Product Type	SIC Group	No. of Companies
Food Products	20	3
Textile Mill Products	22	13
Lumber and Wood	24	2
Furniture	25	3
Rubber & Plastic	30	3
Stone, Clay, Glass, Concrete	32	3
Fabricated Metals	34	1
Machinery	35	1
Miscellaneous	39	1
		30

TABLE III-2

GENERAL DATA SUMMARY TABLE

Characteristics	Average	Range Min		Range Max	Total
No. of Employees	80	5	-	160	2,400
Hours Operation Per Year	4,324	2000	-	8,760	129,720
Annual Energy Use Per Employee MMBTU	764	4	-	6,154	
Total Energy Consumption - MMBTU	45,134	19	-	289,728	1,354,023

TABLE III-3

ENERGY USAGE BY SUPPLY SOURCE

	Average Usage Per Plant		Total Usage		Unit Cost	% of Total Energy Usage	
Utilities	MMBTU	Dollars	MMBTU	Dollars	Dollars Per MMBTU	Energy Basis	Cost Basis
Electricity	8,719	80,583	261,581	2,417,476	9.24	19.3	44.5
Natural Gas	32,671	86,710	980,123	2,601,304	2.65	72.4	47.9
Sub-Total (Avg.)	41,390	167,293	1,241,704	5,018,780	(4.04)	91.7	92.4
Other Sources							
No. 2 Fuel Oil	507	2,417	15,210	72,520	4.77	1.1	1.3
No. 5 Fuel Oil	1,289	3,434	38,663	103,025	2.66	2.9	1.9
Propane	1,948	7,994	58,446	239,821	4.10	4.3	4.4
Sub-Total (Avg.)	3,744	13,845	112,319	415,366	(3.70)	8.3	7.6
Total (Avg.)	45,134	181,138	1,354,023	5,434,146	(4.01)	100.0	100.0

Recommended Energy Conservation Opportunities

The thirty energy audits compiled a total of 137 Energy Conservation Opportunities, or ECO's. Table III-4 provides a breakdown of the number and type of ECO's that were recommended in the reports. A key of the ECO types follows:

1. Lighting: delamping, relamping with higher efficiency bulbs, cleaning skylights.

2. Compressed Air Systems: repairing leaks, reducing system pressure, relocating intakes.

3. Steam Systems: repairing leaks and faulty traps, reducing system pressure, boiler tune-ups, economizers, insulating pipes, condensate return, etc.

4. Heat Conservation and Recovery: insulation of equipment, waste stream heat recovery.

5. HVAC: building insulation, weatherstripping, thermostat setback, dock seals, system balancing.

6. Combustion of Wood or Waste: substitution of wood or waste fuels for conventional energy sources. Includes cogeneration.

7. Turn Off Unused Equipment: pilot lights in auxiliary boilers, exhaust fans, etc.

8. Energy-Efficient Equipment: substitution of energy efficient equipment for older models. Does <u>not</u> include lighting.

As the table shows, these recommendations if implemented could conserve an estimated 370 billion BTU equivalent per year for the thirty surveyed plants, for an overall savings of 27 percent. The dollar savings potential is more than one million dollars annually at current fuel prices.

A surprising 81% of the conservation opportunities recommended fall in categories 1 through 4, (lighting, compressed air systems, steam systems, and heat conservation and recovery). These four ECO types account for 91% of the BTU's and 90% of the dollars in recommended savings. Category 4 (heat conservation and recovery) alone accounts for more than 80% of the total BTU savings and points out the tremendous potential for waste heat recovery as an industrial conservation measure. The inherent efficiency of most electrical energy consumers is apparent from Table III-5. Electrical conservation accounts for only 3.4% of the total BTU savings although nearly one-half of the ECO's written were for electrical conservation measures.

TABLE III-4

COMMON TYPES OF POTENTIAL ENERGY CONSERVATION OPPORTUNITIES

Type	No. of ECO's	Conservation Potential MMBTU's	Conservation Potential $	Percentage of Total BTU Basis	Percentage of Total $ Basis	Averages MMBTU/YR	Averages $
1	25	3,192	37,660	.80	4.00	128	1,506
2	19	1,668	8,440	.40	.89	89	444
3	33	34,498	78,700	9.40	8.40	1,045	2,385
4	38	297,360	724,318	80.40	77.00	7,957	19,061
5	15	9,340	28,067	2.50	3.00	623	1,871
6	2	24,065	57,395	6.40	6.10	12,033	28,698
7	1	365	1,179	.09	.13	365	1,179
8	4	376	4,068	.10	.43	94	1,017
Totals	137	370,864	939,827	100	100		

TABLE III-5

ENERGY CONSERVATION POTENTIAL BY ENERGY SOURCE

Energy Source	Conservation Potential MMBTU/YR	Conservation Potential $	Percentage of Total BTU Basis	Percentage of Total $ Basis	No. of ECO's	Average Savings/ECO MMBTU/YR	Average Savings/ECO $
Electri-city	44,850	112,392	3.4	11.8	72	623	1,561
Natural Gas	295,183	735,032	87.6	77.0	74	3,989	9,932
Fuel Oil	16,914	50,623	5.0	5.3	38	445	1,332
L. P. G.	13,389	55,308	4.0	5.9	14	956	3,950
Totals	370,336	953,355	100	100	198*		

*This number is inflated by ECO's which conserve more than one fuel type, as in the case of multi-fuel boilers.

Implementation of Energy Conservation Opportunities

Industry response to the conservation recommendations has been encouraging. Table III-6 shows that a total of 81 ECO's, or 59 percent of the ECO's written have either been implemented or firmly committed to, resulting in an actual energy savings of 102 billion BTU's and $340,000 each year. The percentages of achieved BTU and dollar savings are much lower, 28% and 36% respectively, reflecting the fact that the small, easily implemented measures or the ECO's requiring minimal capital expense have been done first. The larger, more complex measures requiring substantial investments are potential savers of large blocks of energy. These measures are naturally receiving closer scrutiny by management before such investments are made.

Table III-6 gives also a comparison of the implementation record by ECO category. The waste heat recovery projects in category 4 are capital-intensive and have not yet been implemented in large numbers. As these projects are undertaken, the BTU savings will increase dramatically.

TABLE III-6

RECOMMENDED AND IMPLEMENTED ENERGY CONSERVATION OPPORTUNITIES BY CATEGORY

ECO Type	Number of ECO's Rec.	Impl.	% Impl.	Energy Savings - MMBTU Rec.	Impl.	% Impl.	Dollar Savings Rec.	Impl.	% Impl.
1	25	14	56	3,192	2,866	90	37,660	29,454	78
2	19	12	63	1,688	447	26	8,440	5,132	61
3	33	26	79	34,498	11,494	33	78,700	37,896	44
4	38	12	32	297,360	81,867	27	736,318	243,451	34
5	15	11	73	9,340	4,641	50	29,067	24,681	88
6	2	0	0	24,065	0	0	57,395	0	0
7	1	2	200	365	286	78	1,179	2,179	185
8	4	4	100	376	376	100	4,068	4,068	100
Total (Avg.)	137	81	(59)	370,884	101,977	(28)	952,827	346,861	(36)

TABLE III-7

RECOMMENDED AND IMPLEMENTED ENERGY CONSERVATION OPPORTUNITIES BY ENERGY TYPE

Energy Source	Number of ECO's Rec.	Impl.	% Impl.	Energy Savings - MMBTU Rec.	Impl.	Impl.	Dollar Savings Rec.	Impl.	% Impl.
Electricity	72	39	54	44,850	6,099	14	112,392	57,726	51
Natural Gas	74	39	52	295,183	92,819	31	735,032	276,494	38
Fuel Oil	38	21	55	16,914	3,397	20	50,623	9,847	19
LPG	14	6	43	13,389	337	2	55,308	1,909	3
Total (Avg.)	198*	105*	(53)	370,336	102,652	(28)	953,355	345,976	(36)

*See Footnote - Table III-5

IV. CASE STUDIES

During the course of the energy surveys, several plants made serious commitments to an agressive energy conservation program. Two of the most promising were selected as being of interest to a broad spectrum of manufacturers. Descriptive articles were published in the Conserver, the Industrial Energy Extension Service newsletter referred to previously. This newsletter is mailed to over 6000 manufacturers throughout the state. Copies of these issues are included in this section.

The first company, Crest Finishers in Dalton, Georgia, was selected because of the unusually great potential for energy savings identified. If this company implements every recommendation in the survey report, as its top management has committed to do, it could save up to $300,000 annually.

The second plant, Universal Ceramics in Adairsville, Georgia, was selected because of the broad applicability of the heat recovery principle upon which their installation is based. This company has cut its gas bill by 32 percent since the installation of its heat exchanger.

The case studies are an extremely valuable part of the ARC program. These articles highlight the initiatives of industries in the region, adding credibility to the conservation techniques sponsored by the Georgia Tech engineers. It is felt that articles such as these are probably the single most effective means of convincing industry that conservation measures are both practically and economically feasible.

Industrial energy
CONSERVER
Published by the Industrial Energy Extension Service
Vol. 3, No. 3 May, 1980

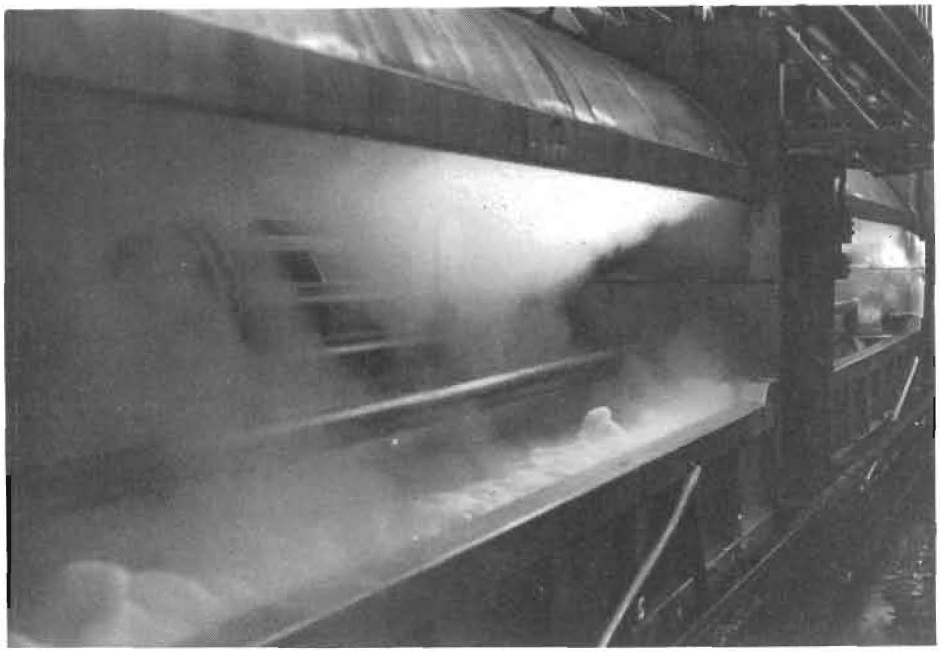
Georgia company saves $300,000 in energy costs

Crest Finishers, Inc., a carpet dying and ıishing company in Dalton, Georgia, ıs initiated a comprehensive energy con- rvation program which could ultimately ve the company over $300,000 each year energy costs. Virtually every industry in e area has suffered from recent price creases for gas, oil, and electricity. Crest ıs committed to hold the line on these ısts through conservation measures, ther than passing them along to their ıstomers.

The company recently completed in- allations of indirect steam heating coils their twelve dye becks, which pre- ously were heated by sparging steam rectly into the dye bath. With the indi- ct heat exchanger, steam condensate is ow returned to the boiler through a new ndensate return piping system, reduc- g the flow of make-up water to the ıiler feedwater heater to a fraction of the iginal volume. The savings from return the condensate alone is expected to be to 12 percent of the total energy use of ıe boiler, although improvements in eating efficiency could increase the total ıvings to as much as 30 percent. The ınual cost savings could amount to over 120,000. As an added benefit, the com- any's use of chemicals for water treat- ent has similarly resulted in additional ıvings because of the lower make up vol- me.

Georgia Tech's EES has assisted Crest ı investigating this and other conserva- on measures, under a program spon- ored by the Appalachian Regional Com- ıission and the Georgia Office of Energy esources. The ARC program is designed o serve the smaller industries (200 em- loyees or less) in the Appalachian region f Georgia.

Other conservation measures which are nder consideration include a waste water eat recovery system, optimization of the ye beck temperature control system, ıstallation of doors on the dye becks, ıodifications to the carpet dryer (includ- ıg exhaust heat recovery), and installa- on of loading dock door seals. The com- any's management has used the survey



Dye becks equipped with indirect heat exchanger save 30% in energy costs.

report prepared by Georgia Tech to pur- sue low cost funding for these projects from the Small Business Administration.

The waste water heat reclamation sys- tem under consideration is particularly attractive in terms of the energy and cost savings potential. This system will use the heat energy in the waste water which is discharged to the sewer to preheat the incoming city water used to fill the becks, through the use of a specially designed shell and tube heat exchanger. The sys- tem is designed to heat over 400,000 gal- lons of water each day, from an average inlet temperature of 50° F to a tempera- ture of 120 to 140° F, with energy that previously was literally being dumped down the drain! As an added benefit, since workers will not have to wait for the water in the becks to warm up from the cold initial temperatures, cycle time will be reduced, resulting in increased produc- tion. The installation will reduce energy costs by $180,000 annually, and should pay for itself in less than four months.

Also of interest is the tenter frame dry- er, in which the carpet is dried after dying. Air to air heat exchangers will use the energy in the hot, moisture laden exhaust air from the dryer to preheat intake air, recovering at least 70 percent of the energy in the exhaust air stream. This installation will save almost $20,000 each year in natural gas.

Another technique which has proven to produce significant results in the optimi- zation of the beck temperature control systems. By preventing excessive heat application during the dying process, use- less boiling of the dye bath can be mini- mized. Although this can be accomplished by instructing personnel in the proper adjustment of the controls, an automatic high limit controller has been recom- mended to eliminate the possibility of human error. The energy savings expected to result from this simple measure should be in excess of $30,000 each year.

Assistance under the ARC energy con- servation program is available to all types of industries in the Georgia Appalachian region. For more information, or to schedule a plant survey, contact project director Doug Moore in Atlanta at (404) 894-3412.

IEES engineer Danny Reed measures exhaust temperature from the compressor at United Poultry Corp.

IEES helps poultry facility save energy

A small Georgia poultry grading facility located near Atlanta is saving energy as the result of a continuing energy management program.

Rising electrical costs have been a concern for the management of United Poultry Corporation in Winder, Ga. In 1978, the company installed a system to recover waste heat from the plant's freezers (see the "Conserver," November 1978). Since that time, the company has expanded its freezer capacity. Company management liked the concept of waste heat recovery and included it in the expansion.

The results of the waste heat recovery system will not be known until later in the year. Company officials and engineers from the Industrial Energy Extension Service (IEES) will monitor the processes to determine the energy and cost savings.

According to Danny Reed, IEES food industry coordinator, it is not uncommon to see larger companies taking an interest in energy conservation, but the smaller firms have been slow to do anything. "The work at United Poultry is particularly interesting because it shows that a company does not have to be a giant to save energy," he said.

United Poultry brings in fresh poultry in bulk, cuts and grades it, freezes it and then markets it in the Caribbean Sea Islands.

"Getting the chicken frozen fast is important in our operation," said plant manager Bruce Bate.

For this reason Bate added to the plant's freezer capacity. The old freezers would cool to 35° degrees below zero; the new freezers cool to 40°-50 degrees below zero.

"This cuts down on the amount of time required to freeze the product."

Heat exchangers were installed to recover heat which would normally be rejected from the refrigeration system in the cooling tower. The recovered heat is used to make hot water which can be used for space heating and to wash down the plant at the end of each day.

Tech to hold wood energy workshop

The potential for wood energy in industrial processes is the topic of a May 29 workshop at Georgia Tech in Atlanta.

The session will run from 8:30 a.m. to 12:30 p.m. in Room 3 of Tech's Space Science and Technology Building. Registration is at 8 a.m. and a course fee of $10 will be charged.

Applicants are urged to register well in advance to ensure a place at the workshop. Parking on the Tech campus is limited so course participants should arrive early on May 29 for the session.

The object of the workshop is to provide technical and economic information on equipment and processes in which wood is used as a fuel.

Course material is geared for plant managers and engineering personnel responsible for conversions to alternate fuels. The information presented also will be of benefit to potential wood fuel suppliers, private consultants and officials from government agencies.

On the workshop agenda will be discussions of processes and equipment for gasification, pyrolysis and direct combustion. Case studies will be presented in each of these areas.

Further information on the workshop is available from Joanne Bocek, Georgia Tech, Engineering Experiment Station, Atlanta, Ga. 30332 (Telephone: 404/894-3635).

IEES engineers speak on WTB

IEES was represented by two Georg Tech engineers who participated in t eight-hour marathon Energy Form Exp on WTBS-TV April 26-27. The progra included film clips, well-known ener authorities, panel discussions, and call- questions from the television audienc Subjects addressed included the historic energy perspective, energy conservatio the influence of energy on lifestyles, sol energy, nuclear energy and public opi ion following Three Mile Island, ar future energy sources. The show w broadcast nationwide by cable TV st tions carrying WTBS and questions we phoned in toll-free by viewers from acro the country.

Hank Jackson, P.E., of the Ener Conservation Division represented IEE during the first two-hour segment ar spoke on the fossil fuel depletion cris and conservation alternatives to reduce i impact. During this segment film cli were shown of typical residential ener audit procedures. Several oil and g industry representatives were preser who tended to blame the shortages governmental regulation. Mr. Jacks noted that there was only a finite quanti of these fuels in the earth when drilli began and that the most readily accessib supplies were pumped out first. Futu production will cost more because the that is left is deeper or more difficult reach, and eventually all supplies that c be economically obtained will be exhaus ed. He noted that oil production peak in the U.S. in the early 1970's, and wor production may peak in the 1990's.

David Keith, P.E., also of the Ener Conservation Division, was in the au ence for the final three-hour segment ar responded to the film which was a seri of interviews with the residents near Thr Mile Island and spoke on nuclear fusio Mr. Keith addressed the psychology nuclear power, noting that America have a natural fear of nuclear ener because atomic bombs were the publi first introduction to nuclear energy. M Keith remarked on the emotional co ponent of the issue and how negative pu lic opinion will likely, together with unfa orable economics, severely limit futu expansion of nuclear power plants. H noted that at the present time, with re shortages of fossile fuels, our country ca not afford a wholesale shutdown nuclear plants.

CONSERVER
Ken Wieder, *Editor*

Published bi-monthly by the Industrial Energy Extension Service

Energy Tip #32

Dock seals reduce heating and cooling expenses

Heating a building is analgous to filling a leaking bucket with water. To keep the bucket full, water must be continuously added. It is better to keep heated air inside a building by sealing the leaks than to spend additional energy for heating replacement air. This analogy is applicable also to air conditioning losses.

Shipping doors are one source of air leaks in factories and warehouses when they are open to the outside during loading and unloading operations. These losses can be reduced with dock seals that provide a snug fit between the loading door and the back of a semi-trailer or truck.

The graph from Energy Tip No. 5 (reproduced for convenience on the back) can be used to determine the annual heat loss for various size openings given an average number of open hours per day during a six month heating season. The size of the open area can be determined from the chart below.

EXAMPLE

A bakery located in Atlanta has eight 8′ x 10′ loading doors. At any given time trucks are being loaded through three of these doors. The truck size is 8′ x 10½′. The average distance from the truck to the loading dock is 8 inches. The warehouse is heated at 65° F with natural gas at a cost of $3.50/million BTU.

From the chart below, the open area at each loading dock is 39.6 square feet. At 24 hours per day the graph gives the annual heat loss as 700 x 10^6 BTU/yr. For three loading docks (average) the annual heat loss is 2,100 x 10^6 BTU/yr. Dock seals installed on each of the eight loading doors at a cost of $900 ea. ($7,200 total) virtually eliminates this loss.

The cost savings are calculated as follows:

$3.50/$10^6$ BTU x 2,100 x 10^6 BTU/yr. = $7,350 annual savings

$\frac{\$7,200 \text{ (installation cost)}}{\$7,350 \text{ (annual savings)}}$ = 1 year simple payback period

Suggested Action

Estimate the amount of energy lost through loading dock doors, taking into consideration the number of doors, door size, truck size and the average number of hours each door is open. Dock seals come in a variety of designs with, of course, a variety of prices. Consult with several vendors to determine the best seal for your applications.

OPEN AREA IN SQUARE FEET
(Distance from Truck to Door)

TRUCK SIZE	OPENING	4″	6″	8″	10″
8′x10′6″	8′x8′	17.0	19.9	22.8	25.7
8′x12′6″	8′x8′	8.3	12.5	16.7	20.8
8′x10′6″	8′x9′	25.3	28.2	31.1	34.0
8′x12′6″	8′x9′	10.6	14.4	18.3	22.3
8′x10′6″	8′x10′	33.7	36.6	39.6	42.5
8′x12′6″	8′x10′	18.3	21.9	25.5	29.1
8′x10′6″	10′x10′	49.0	50.2	51.8	53.9
8′x12′6″	10′x10′	33.2	34.7	37.0	39.5

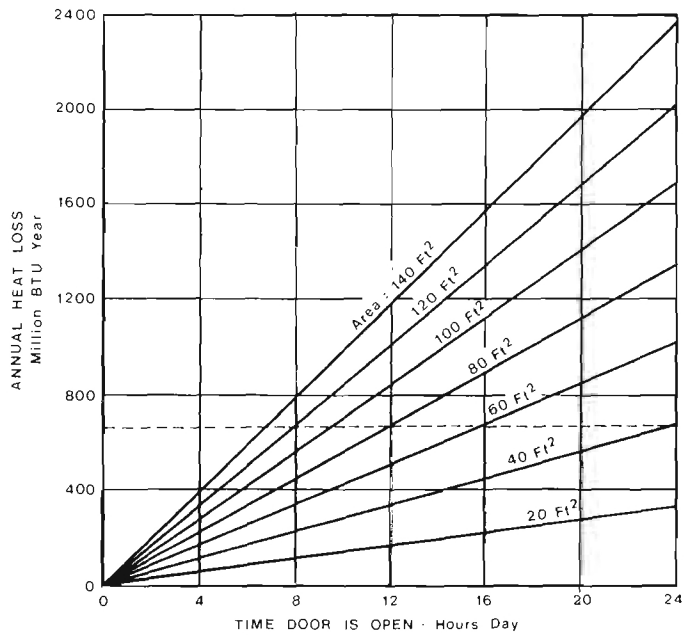


Figure 1 - Heat Loss Through Open Doors

IEES now offers 32 energy flyers

IEES now has 32 one-page energy flyers that are available free to all industries in Georgia.

Please order by number from the Industrial Energy Extension Service, Engineering Experiment Station, Georgia Tech, Atlanta, Georgia 30332.

1. Steam Cost Chart
2. Eliminate Steam Leaks
3. Inspect and Repair Steam Traps
4. Insulate Bare Steam Lines
5. Install Traffic Doors on Frequently Used Openings
6. Boiler Tune-Up
7. Night Setback of Space Temperature
8. Keep Boiler Tubes Clean (Water Side)
9. Reduce Vapor Losses from Heated Open Vessels
10. Return Steam Condensate to Boiler
11. Lower Pressure of Compressed Air to Minimum Necessary Level
12. Install Compressor Air Intakes in the Coolest Locations
13. Eliminate Leaks in Compressed Air Lines
14. Hot Wash Water
15. Recover Heat from Textile Dryer Exhaust Streams
16. Additional Effects Reduce Evaporator Steam Cost
17. Use Refuse as Fuel
18. Convert to More Efficient Light Sources
19. Convert to Energy Efficient Fluorescent Lamps
20. Flashing High Pressure Condensate to Regenerate Low Pressure Steam
21. Minimize Boiler Blowdown
22. Reduce Reflux Ratios in Distillation Columns
23. Heat Recovery from Boiler Blowdown
24. Use Liquefied Gases as Refrigerants
25. Reduce Energy Losses Across Control Valves
26. Skylights Provide Free Illumination
27. Vapor Recompression Can Reduce Steam Costs
28. Heat Recovery from Boiler Flue Gases
29. Use Low Grade Waste Heat to Power Absorption Refrigeration Units
30. Move Electric Motors from Conditioned Spaces
31. Air Curtains Restrict Conditioned Air Loss
32. Dock seals reduce heating and cooling expenses.

Tech researchers design solar classroom

Georgia Tech engineers will design a solar energy system for heating a modular classroom under development.

Tech's Engineering Experiment Station will complete the system for Madison Industries of Georgia, a Conyers-based firm specializing in construction of prefabricated modular buildings.

Madison Industries has a contract from the Department of Energy to prepare the finished engineering design for a modular building with passive solar energy features. The company has subcontracted the solar phase of the work to Tech.

The classroom will be a fabricated unit which can be disassembled and re-erected at different school sites, as population shifts occur in school districts. The passive solar system will be a standard part of the design.

Passive solar devices capture energy from the sun through non-mechanical means, such as natural air flows, shading and moveable insulation. Active solar systems use machines such as motors, pumps and blowers to collect the sun's energy.

"Our design will emphasize passive systems," said Jim Clark, Tech's program manager. "But we can incorporate some elements of an active system, so long as it remains only a small part of the overall design."

Solar energy will provide heat and may be used also to ventilate, light and cool the classroom, Clark said.

"We think solar energy can substantially reduce the structure's fuel costs," he added. "Anything we develop will be applicable to other modular buildings."

Tech will use engineers from its Technology Applications and Energy Research laboratories for the project, with additional help coming from an advisory committee of other solar researchers on Tech campus.

The engineering team will submit t proposals to Madison Industries review. One will be used as the basis the final design. If DOE approves completed plans, the agency probably offer Madison the opportunity to b and test market the structure.

Madison Industries deals primaril commercial modular buildings such service stations, mini-warehouses and food restaurants.

"We're pleased to be contractor for project," said Joe Van Dover, marke director for Madison Industries of G gia. "Solar Energy will become incr ingly accepted commercially in con years and we're happy to play a rol furthering market awareness of the a able energy options."

Wieder is new *Conserver* editor

A media specialist has been named editor of *The Conserver*.

Ken Wieder replaces Mark Hodges as editor of the publication. Hodges has become a writer for Georgia Tech's Engineering Experiment Station's public relations staff.

Wieder, 31, will serve as a public information specialist and media technologist for the IEES as well as editor of *The Conserver*.

He comes to the program from the U.S. Center for Disease Control, Atlanta, Ga., where he was a bio-medical photographer.

He has also been editor of "Today's Chiro practic" magazine and a media specialis at Georgia State University in Atlanta.

Wieder is a native of Clifton, N.J., an is a 1971 graduate of the University o Maine. He received his Master's degre also from Maine in 1975. He has als attended Georgia State University.

He is married and lives in Norcross.

Ken Wieder, *Editor*

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Industrial energy
CONSERVER

Published by the Industrial Energy Extension Service

. 3, No. 5 November 1980

ch Designs ood Gasifier

future oil shortages possible and prices increasing steadily, Georgia ew wood-fueled gasifier can make le contribution to energy conser- particularly in the state of Geor- Tech gasifier is a 10-foot cylindri- al vessel in which wood or other materials are burned with very The end product of this combus- ocess is a liquid, synthetic gas s suitable for industrial applica- ch as drying textiles or firing up The gas may also be usable in bile engines.

economics of this gasifier appear avorable. Tech researchers calcu- the cost of a gallon of oil is three e cost of its equivalent in gasified so, the cost of converting most al boilers to a wood gasification rce is half the price of a new wood

iers have been in existence since y 1800's but until recently they en plagued by problems which em undesirable to manufacturers. ast:

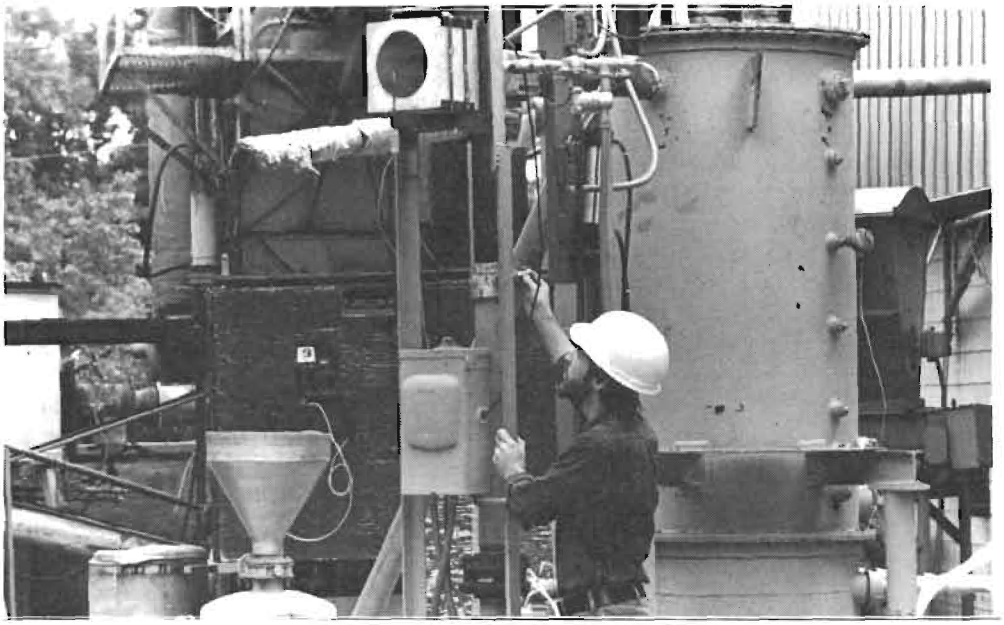
npurities in the gas, such as tars, up gasifier pipes and burners.

sh from the burned wood melted ubstance known as slag, plugging ier grates and in some cases over- and burning out the grates.

Georgia Tech gasifier has a burner s close-coupled to the unit and less le to deposits of tars. The gasifier s a tubular, air-cooled grate to act slag accumulation and grate t.

Georgia Tech gasifier has been developed in the Technology Applications Laboratory of the Institute's Engineering Experiment Station. The designer of the gasifier is Tom McGowan, a research engineer in the Laboratory's Wood Energy Branch. Initial testing started last May and a series of trial runs undertaken during the summer resulted in higher gas outputs than expected and a good quality liquid fuel. Georgia Tech is now applying for a patent and intends to license its gasifier technology to manufacturers for commercial development. Tech researchers hope that the current experiments with the model will eliminate some of the obstacles to smooth, rapid conversion of industrial energy systems to gasifiers.

Georgia industries could make particularly good use of the gasifier. Georgia has more forested acreage than any state in the union and some energy researchers believe that as much as a quarter of the state's annual energy requirements could be met by wood wastes alone. The proximity of these fuel supplies should enhance the economics of gasifier conversion in this state.



Tom McGowan, research engineer checks wood gasifier on Tech campus.

Wood Energy Workshops To Be In November

Georgia Tech's Engineering Experiment Station will conduct two workshops in November. "Case Studies in Wood Energy" will be presented on Nov. 5 at the Space Science and Techology Building on the Georgia Tech campus in Atlanta. The same workshop will be held November 25 at the Downtowner in Savannah.

The objective of the workshop is to provide a design approach to wood energy systems for industry, substantiated by case studies. Topics covered will include feasibility studies, contracting and permitting procedures, wood fuel drying, economics of wood versus fossil fuels and a review of demonstration projects in Georgia.

The workshop will cost $20 per person which will include lunch. For more information contact Carol Aton at (404) 894-3412.

Alcohol Still Nears Completion

The Georgia Tech demonstration distillation unit is nearing completion. Boiler stand up and component testing began in September. The unit is designed to produce 25 gallons per hour of 190 proof alcohol. It will be used to demonstrate the basics of alcohol production in work shops and to perform research in alcohol production.

Several different research areas are being considered. These include alcohol dehydration (alcohol must be 199 proof to be used in gasohol), energy use in distillation, energy efficient methods to process mash, and other areas as well. Because of its size (25 gallons an hour is equivalent to 200,000 gallons each year) the unit can be used as a pilot plant to test concepts on a large scale.

Alcohol Study Available

ATLANTA, GA....Georgia Tech's Economic Development Laboratory has made a study of the economics of gasohol production in Georgia.

The findings are contained in a 35-page booklet published by Tech and entitled, "Fuel Alcohol Production in Georgia — A Preliminary Study." Authors of the study are researchers Tze I. Chiang and Robert L. Collins of Tech's Engineering Experiment Station.

The booklet is geared to the level and interests of the prospective producer. It was written to help individuals decide whether they can start an alcohol distillery economically.

The study focuses on a model case involving a plant making 1.5 million gallons of alcohol per year. It provides information on available feedstocks, gasohol needs in Georgia, kinds of fuel suited for alcohol production and a variety of other data.

Copies of the booklet are available at $3.00 each by writing: Mary Edna Anders, Georgia Tech, Engineering Experiment Station, Economic Development Laboratory, Atlanta, Ga. 30332.

CONSERVER
Ken Wieder, *Editor*
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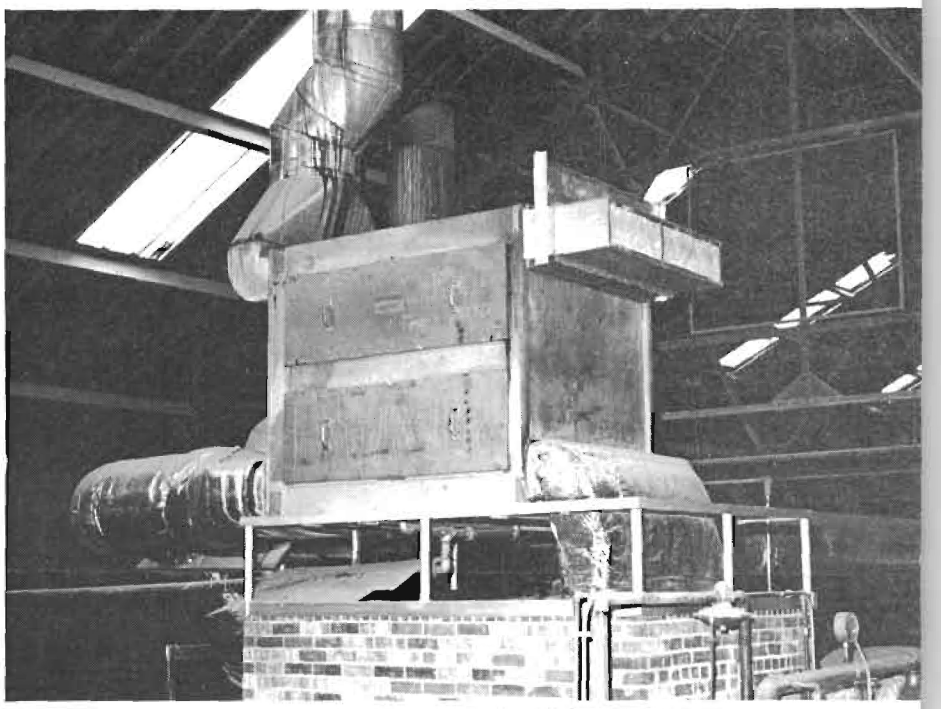


Waste Heat Recovery Unit at Universal Ceramics.

Tile Company cuts gas bi

By Doug Moore

Universal Ceramics Inc., a quarry tile manufacturer located in Adairsville, Georgia, has recently completed installation of a heat recovery heat exchange that has cut their gas bill by almost 32 percent. To make quarry tile, employees take shale, mined from a nearby quarry and grind it, wet it, extrude it into a long continuous strip, cut it into lengths, dry it in a large oven, and then fire it in a kiln. A great deal of energy is used in the process, particularly in drying and firing the tile. Both the dryer and the kiln are heated with natural gas, and until recently, the hot exhaust gases from the kiln were discharged to the atmosphere. The new installation, engineered by Mr. John English of Resh and Redd Inc. in Atlanta, utilizes a Z-Duct air-to-air heat recovery heat exchange. This preheats the intake air to the dryer with heat energy recovered from the hot kiln exhaust gases. The heat exchanger permits heat transfer from the exhaust to the make-up air, while maintaining physical separation of the two air streams. This prevents moisture and other contaminants present in the exhaust from entering the dryer.

To protect against harmful contaminants in the exhaust air, an aluminum alloy was selected as the construction material of the heat exchanger. A 1-mil coating was applied to the "dirty" si extra protection, although measure of sulfuric acid in the kiln exhaus cated only trace amounts.

Once installed, the heat recover performed even better than exp With exhaust gases entering the 293° F, the make-up air was heate room temperature to approxi 215° F. The actual temperatures wi somewhat with the outside air ter ture and the plant air temperature, efficiency of the unit should remain constant at 68 to 70 percent.

Saved 32%

Operation with the unit install cut Universal's gas bill by 31.7 p resulting in a monthly savings o $1900. The total cost of the insta amounted to roughly $13,000. This that the installation will pay for it less than seven months.

Applications for this type of u based on the temperature of the ma stream, its proximity to a process the energy can be utilized, and th taminants in the waste air. Opport for waste heat recovery exist in vi every industry, whether the waste in the form of hot air, hot waste rejected heat from refrigeration

(Continued Back Page)

luidized Bed Technology To Play arge Role in Energy Future

By Norris Garmon

National Energy Plan calls for an d use of coal in industry and bet- ervation of energy. The dwindling and escalating prices of oil and gas have resulted in plans to shift nate fuels. The expanded use of lds great promise for bringing his desired change in direction. d-bed combustion systems may significant role in permitting the tion of coal in an environmentally d manner — a step forward to- ne utilization of clean (non-pollut- hnologies. This technology offers the additional flexibility of burn- ally any type of fuel, separately or inations, without significant boil- fications.

luidized-Bed Principles

1980's started out with new alter- to the energy problem: energy ation as a "resource," and return as the prime source of industrial Industry views these ideas with motions — that is, the two ideas viewed as necessarily being mutu- clusive. Some, perhaps most, ac- two together; others accept only an alternative with a real solution national energy problem. The or fluidized-bed combustion rests remise that coal will once again be or source of energy for industry. ll certainly be contingent on future of the Environmental Protection s at both federal and state levels, future availability and cost of oil ural gas.

e are two basic concepts to fluid- d combustion processes. These are ospheric and pressured FBC sys- ressurized FBC system lends itself bined cycle (steam and gas appli- . The pressurized fluidized-bed ogy has not advanced as quickly unterpart. Gas turbine blade ero- m particulates in the combustion ill a major problem to resolve. The of erosion of turbine blades re- hat combustion gases be virtually free of particulate matter. Removal of more than 99 percent of the particulates by cyclone separators and electrostatic precipitators has proven not to be sufficient. There is also the added problem of corrosion of the turbine parts by potassium and sodium impurities in the coal. Currently there are no pressurized fluidized-bed combustion units in commercial operations in the United States.

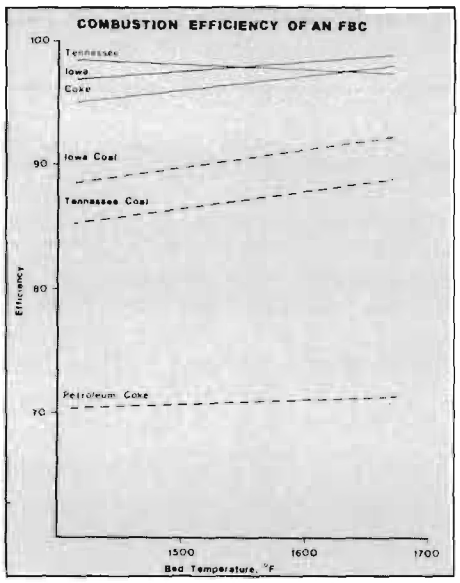
The atmospheric fluidized-bed research has progressed more rapidly than the pressurized FBC. Several pilot plants and commercial units for steam production have been built and generally have been operating with proven success. Atmospheric FBC units designed for industrial use seem to have the best near-term commercial feasibility. Atmospheric FBC units are currently being marketed by several firms in the United States and in Europe. While some units are field erected and rated up to 500,000 pounds of steam per hour, most are packaged units rated around 100,000 pounds of steam per hour.

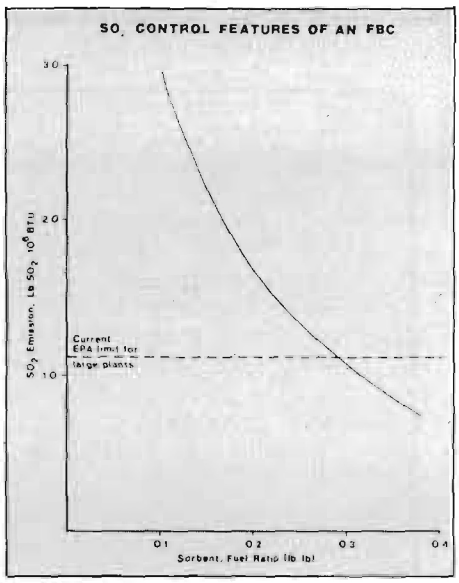
FBC Boiler Lower Cost

Compared to a field erected conventional boiler of the same capacity, a packaged FBC boiler has lower initial cost and lower operating cost-according to FBC boiler manufacturers. The lower initial cost stated is due to the FBC boiler being smaller in size than the equivalent rated conventional boiler. This is because of better heat transfer coefficients and reduced refractory material in the FBC boiler. The lower operating cost is realized from the FBC's multifuel capability and reduced maintenance factor. The FBC boiler will burn virtually anything that will support combustion. Maintenance is reduced because the problem with slagging is minimized, there is less refractory material, and there are fewer moving parts (compared to a stoker fired boiler). The problems with slagging is reduced as the bed temperature is typically 1600-1700°F, which is below the melting/fusion temperatures of most coals.

Probably the most impressive feature of a fluidized-bed combustor is that it burns coal cleanly, without the need for expensive sulfur removal equipment. Experience from actual functioning plants report that SO^2 emissions are well below current pollution standards. The bed material, usually limestone or dolomite, removes most of the SO^2 from the combustion gases. This spent bed material may find uses in agricultural applications as a mineral substitute for crops.

Despite its proven performance in pilot plants and new commercial units, industry appears to be responding very slowly to fluidized-bed technology. Manufacturers of fluidized-bed boilers point out the economic advantages in conversion from fuel oil and natural gas to coal, but industry is hesitant to quickly accept this new concept. Industry prefers to allow sufficient time to have the minor problems, typical of a new technology, resolved. Fluidized-bed combustion systems are at that point today.





Energy Conscious Housekeeping

By LuAnn Rockett

For the always energy conscious plant managers and engineers, there are many no-cost housekeeping techniques which can save on the annual energy consumption of the plant. These operation and maintenance procedures not only reduce energy consumption, but also increase the life expectancy of many equipment items.

OPERATION AND MAINTENANCE

General Building

Involve the maintenance staff and production personnel in the ECO's so everyone has a part in it.

Seal ducts and access doors in equipment rooms to minimize the short circuiting of hot and cold air.

Control building load demand so that no excessive peak demand will be experienced.

When painting walls, use light colored paints with good reflective values.

Heating/Boiler System

Reduce the amount of cold air admitted into the boiler room in winter without choking the boilers.

Lower the firing rate so that the boilers will operate for longer periods of time, decreasing off cycle losses.

Reducing Loads — Air Compressors

Air compressors are large energy users and generally are significant contributors to a facility's KW demand. To investigate energy conservation potential, the entire compressed air system consisting of the compressors, the air receivers and individual load requirements must be studied.

Set the controls to maintain minimum building temperature of 45° or 50° on weekends, nights, and holidays.

Regularly check the stack gases for O^2 and CO^2 content to assure proper excess air for combustion.

Make sure of good, unobstructed air flow to burner air inlet.

Ventilating

Clean the filters frequently to increase the overall efficiency of the air handling units.

In summer, spring and fall, when the outdoor air temperature at night is lower than the indoor temperature, use full outdoor air ventilation to remove excess heat and to precool the structure to reduce the air conditioning load.

Keep outside dock and loading doors closed to decrease load on HVAC systems.

Domestic Hot Water

Reduce the water temperature to 110° F or less, especially if the hot water is only for personnel use.

Remove or shut off hot water to spaces where or when not needed therein.

Lighting

Lower the wattage or replace all incandescent lights with fluorescent or other more efficient lights.

Clean the lenses and reflectors.

Keep ceilings, walls, and floors cle
utilize the reflective value of sam

Replace lamps after rated life r
than before they start to flicker.

Compressor air intake. More ene
required to compress hot air th
required to compress cold air, and
compressor rooms are hot. By ru
the intake duct to the outside, con
able energy savings can be realiz

Eliminate air leaks. A subst
amount of energy in industrial pla
wasted through air system leaks. A
tion should be given to a better m
nance program to reduce this los

By maintaining good houseke
practices, a company can save se
hundred dollars a year. For more
mation regarding these practices, w
Georgia Tech's Technology Applic
Lab or call 894-3412.

Tile Company (from

ment, boiler blowdown, or some
source. As the cost of energy contin
rise, the economics of heat recover
tems will continue to improve.

Assistance in evaluating the feas
of their installation was provided t
versal by Georgia Tech's Engin
Experiment Station, through an
trial energy conservation assistanc
gram sponsored by the Appal
Regional Commission. This progr
available to small industries (200 en
ees or less) in the 35 county Appal
region of Georgia. For more inforn
on the program, contact project di
Doug Moore at (404) 894-3412.

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V. ENERGY CONSERVATION WORKSHOPS

Two industrial energy conservation workshops were held in the ARC region as a part of this program. The workshops were held on September 30 in Gainesville, Georgia and October 21 in Calhoun, Georgia. Beginning at 9:00 am and continuing until approximately 3:30 pm, they provided a full day of training on the basic elements of energy conservation to a total of 31 attendees. An extensive loose leaf manual prepared by the Engineering Experiment Station was given to each workshop participant. All of the participants considered the workshop to be worthwhile.

Workshop attendees were contacted by telephone within two to four weeks from the date of the workshop to determine if any energy conservation measures had been undertaken as a result of knowledge gained at the workshops. Although several attendees commented that various measures were under consideration, at this time it is not possible to determine any quantifiable savings. This is likely a result of the short time span available between the workshop and the telephone follow-up, and the fact that a total of eleven attendees, or 35 percent of total workshop attendees were employees of companies previously surveyed under this program. Energy savings achieved by these firms is recorded in section III of this report. It is felt, however, that attendance at the workshops will serve to reinforce the convictions of these individuals in the implementation of energy conservation measures.

VI. PROGRAM COST/BENEFIT ANALYSIS

Table VI-1 on the following page gives specific information on the costs and cost effectiveness of the implemented ECO's on a plant-by-plant basis. The thirty plants surveyed invested over $130,000 to implement 81 ECO's, which yield annual cost savings of over $340,000. Excluding the cost of the program (which of course was not borne by the client companies), these figures result in a savings/cost ratio of 2.62/1. In other words, the companies' investment will be paid back in just over 4.5 months on the average. First year net savings will amount to $210,000.

If the program cost of approximately $78,900 is included with the client cost, the savings/cost ratio of the overall program is 1.65/1. At this rate, the total program costs will be recovered in a little more than seven months. In every case except one, the client companies will recover their investment in less than one year. The plant with the greatest savings/cost ratio (2211/26) expects to save $54,665 annually with an investment of only $2,352.

TABLE VI-1

PLANT BENEFIT / COST RELATIONSHIPS

Plant Code	No. of ECO's Implemented	Cost of Implemented ECO's	Average ECO Impl. Cost	Program Cost	Total Dollar Costs	Annual Dollar Savings	Savings/Cost Ratio
2201/1	4	17,048	4,262	2,630	19,678	21,192	1.08
2401/2	3	2,805	935	2,630	5,435	3,469	0.93
3502/3	0	0	0	2,630	2,630	0	-
2202/4	3	76,200	25,400	2,630	78,830	114,756	1.46
2501/5	4	595	149	2,630	3,225	3,883	1.20
3901/6	5	2,100	420	2,630	4,730	26,214	5.54
2402/7	0	0	0	2,630	2,630	0	-
2203/8	4	964	241	2,630	3,594	9,216	2.54
3001/9	3	2,710	903	2,630	5,340	7,801	1.46
2001/10	2	0	0	2,630	2,630	1,515	0.58
2205/11	3	1,375	458	2,630	4,005	1,539	0.38
2206/12	3	3,110	1,037	2,630	3,667	6,588	1.15
2207/13	2	0	0	2,630	2,630	1,478	0.56
2002/14	1	0	0	2,630	2,630	1,620	0.62
2204/15	5	2,020	404	2,630	4,650	24,047	5.17
2208/16	4	4,914	1,229	2,630	7,544	9,053	1.20
3203/17	2	50	25	2,630	2,680	235	0.09
2209/18	2	0	0	2,630	2,630	1,076	0.41
3002/19	2	275	138	2,630	2,905	1,552	0.53
3201/20	2	13,512	6,756	2,630	16,142	18,575	1.15
3401/21	0	0	0	2,630	2,630	0	-
2503/22	4	225	56	2,630	2,855	2,717	0.95
3202/23	1	0	0	2,630	2,630	16,520	6.28
2203/24	4	164	41	2,630	2,794	3,163	1.13
2210/25	1	25	25	2,630	2,655	1,154	0.43
2211/26	6	2,352	392	2,630	4,982	54,665	11.0
3003/27	0	0	0	2,630	2,630	0	-
2502/28	3	1,034	345	2,630	3,664	757	0.21
2212/29	4	776	194	2,630	3,406	6,532	1.92
2213/30	4	916	229	2,630	3,546	6,968	1.96
Totals (Overall Average)	81	130,594	(1,573)	78,900	209,494	340,285	(1.65)

VII. FUTURE CONSERVATION POTENTIAL

Total energy consumption by end users in Georgia in 1978 amounted to about 1,131 trillion BTU's. Approximately 20.4% of this energy, or 231 trillion BTU's, was consumed in the 35 county area encompassed by the Appalachian Regional Commission. This percentage closely parallels the ratio of the population of the region to that of the whole state, which is aproximately 19.7%. Similar comparisons according to end-use sector are depicted graphically in Figure 1.

Annual energy consumption by the industrial sector of the Georgia Appalachian Region amounted to approximately 68 trillion BTU's (in 1978), or roughly 29% of the total energy consumption of the region. Of this amount, the textile industry accounts for 56%, making it the dominant industry group in terms of energy use. The second greatest energy use group, stone, clay, and glass, consumes only 11% of the region's energy. Figure 2 gives a breakdown of energy use among the major industry groups. The most popular energy sources in the region are natural gas and electricity, representing 46% and 31% of total usage, respectively. The distribution of energy use by source is depicted graphically in Figure 3. Table VII-1 gives a detailed breakdown of energy use by SIC group and by energy source.

A survey of the industrial population of the region indicates a total of approximately 1800 industrial plants. Of the major groups, the textile industry is the largest, with 29% of the total population. The remaining groups each represent 10% of the total or less. Thus other manufacturing in the area is relatively diverse. The textile industry can clearly be seen to be one of the more energy intensive industries, with a per plant energy usage almost twice the average. A listing of the number of plants in the region, by SIC group, is give in Table VII-2. The thirty plants surveyed under this program represent only 1.7

percent of this population.

The total energy consumption of the thirty plants surveyed amounts to 1.35 trillion BTU's, or about 2 percent of the area's total industrial consumption. If the assumption is made that a similar program could reach just 50 percent of the region's industrial population, the potential for energy conservation would be over 9.3 trillion BTU's, or about 14% of the total energy consumption in the region. The corresponding cost savings would amount to over 23.6 million dollars.

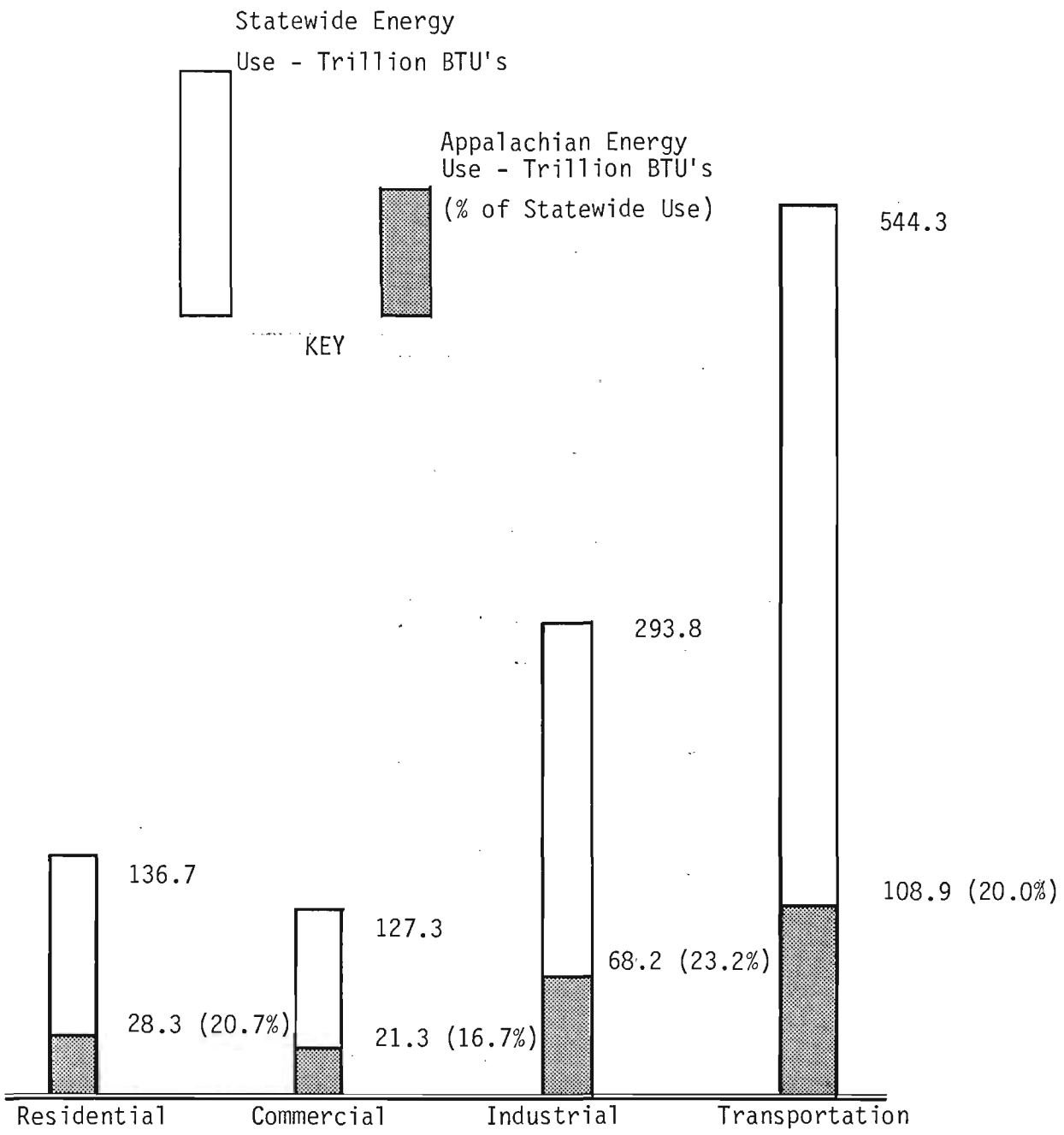

Figure 1 - Energy Use Profile

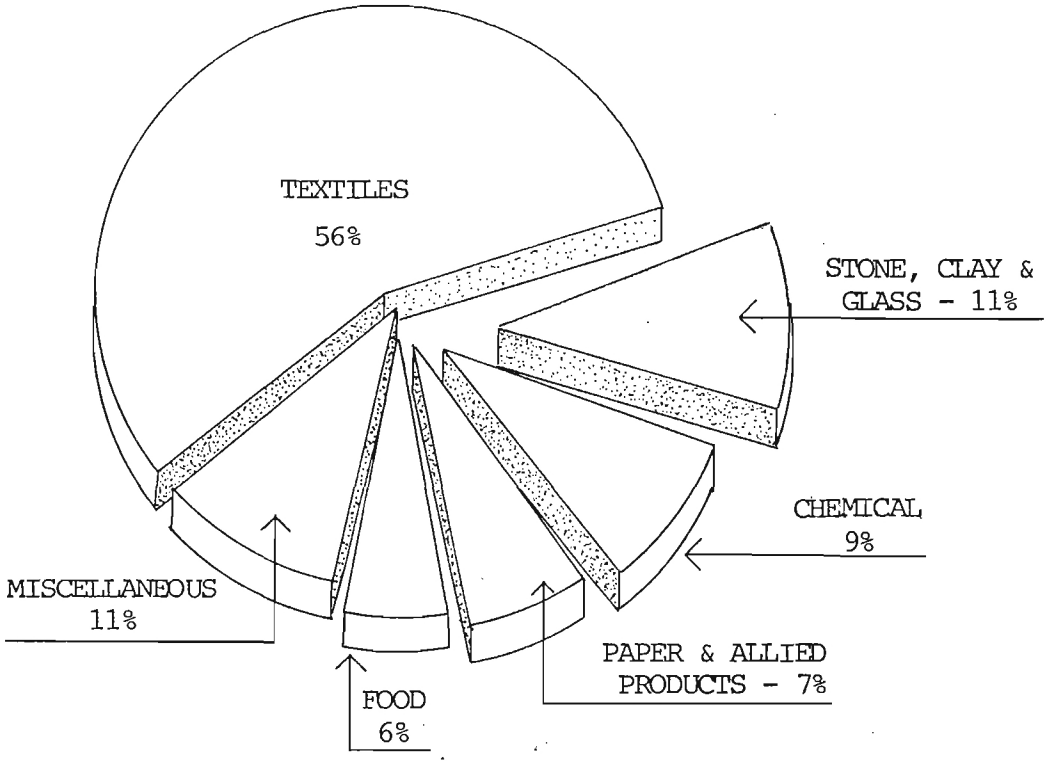

FIGURE 2 - ENERGY CONSUMPTION BY INDUSTRY GROUP

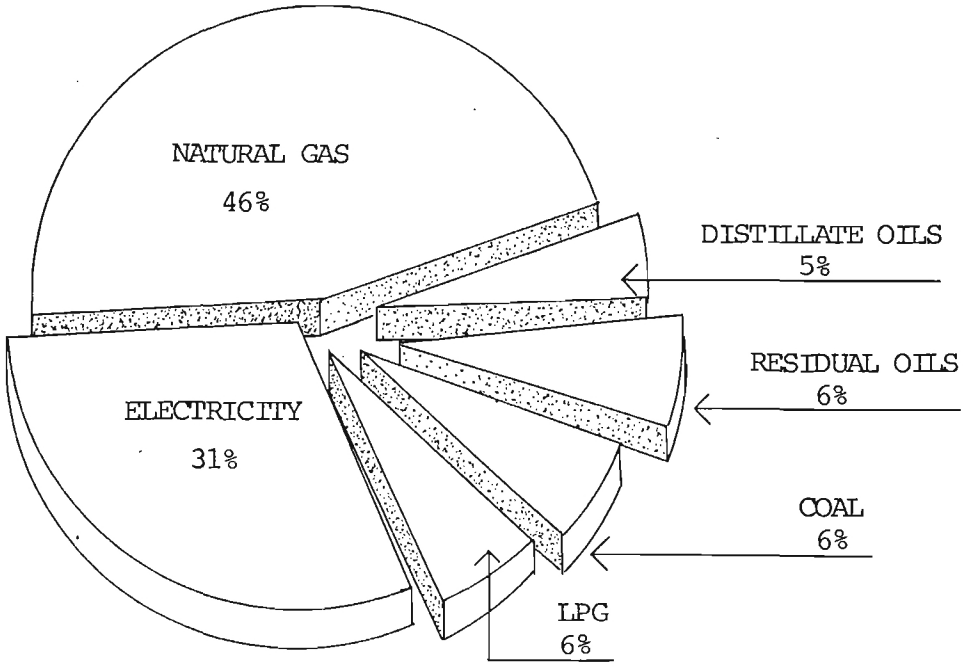

FIGURE 3 - ENERGY CONSUMPTION BY SOURCE TYPE

TABLE VII-1 - APPLACHIAN REGION INDUSTRIAL ENERGY CONSUMPTION - 1978
Billion BTU's

Industry	SIC	Electricity	Nat. Gas	LPG	Distillate Oils	Residual Oils	Coal	Total
Food & Kindred Products	20	849.7	1916.2	268.4	238.0	56.0		3328.3
Textile Mill Products	22	11152.0	12600.0	1813.5	1530.0	2058.0	2107.5	31261.0
Apparel	23	389.0	367.5	32.6	15.2	3.5	12.6	820.4
Furniture & Fixtures	25	70.8	52.5					123.3
Paper & Allied Products	26	566.0	1312.0	210.3	702.6	1064.0	170.4	4025.3
Printing & Publishing	27	65.5	131.0				50.0	246.5
Chemicals & Allied Products	28	1486.9	2441.0	348.0	180.0	231.0	460.0	5146.9
Rubber & Plastic Products	30	637.3	603.0	94.3	39.7	59.5		1433.8
Leather & Leather Products	31	93.8						93.8
Stone, Clay & Glass	32	708.0	4331.0	638.3	271.9		353.0	6302.2
Primary Metals	33	584.0	787.5	94.0				1465.5
Fabricated Metal Products	34	177.0	787.5	10.0	52.0			1026.5
Machinery	35	177.0	210.0	25.0				412.0
Electrical Machinery	36	531.0	262.0	32.6	9.1	14.0		848.7
Transportation Equipment	37	177.0	262.0	32.6		10.5		482.1
Totals		17702.0	26250.0	3627.0	3055.0	3500.0	3155.0	57289.0

TABLE VII-2 - INDUSTRIAL POPULATION IN THE APPALACHIAN REGION

Industry	SIC	No. of Plants	% of Total
Food & Kindred Products	20	187	10.5
Textile Mill Products	22	288	16.2
Apparel	23	224	12.6
Lumber & Wood Products	24	170	9.5
Furniture & Fixtures	25	57	3.2
Paper & Allied Products	26	20	1.1
Printing & Publishing	27	139	7.8
Chemicals & Allied Products	28	85	4.8
Petroleum Products	29	8	.5
Rubber & Plastic Products	30	83	4.6
Leather & Leather Products	31	15	.8
Stone, Clay & Glass	32	115	6.4
Primary Metals	33	23	1.3
Fabricated Metal Products	34	126	7.1
Machinery	35	165	9.2
Electrical Machinery	36	32	1.8
Transporation Equipment	37	13	.7
Photographic, Medical, & Optical Goods	38	9	.5
Miscellaneous	39	25	1.4
Totals		1784	100.0